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Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

VOLUME I.

(DECADES I. TO X.)

BY

FREDERICK McCOY, F.R.S.,

HONORARY MEMBER OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; HONORARY ACTIVE MEMBER OF THE IMPERIAL SOCIETY OF NATURALISTS OF MOSCOW; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF THE ROYAL SOCIETY OF NEW SOUTH WALES; HONORARY FELLOW OF THE GEOLOGICAL SOCIETY OF EDINBURGH; HONORARY MEMBER OF THE GEOLOGICAL SOCIETY OF MANCHESTER, ETC., ETC., ETC.

AUTHOR OF "SYNOPSIS OF THE CARBONIFEROUS LIMESTONE FOSSILS OF IRELAND;" "SYNOPSIS OF THE SILURIAN FOSSILS OF IRELAND;" "CONTRIBUTIONS TO BRITISH PALÆONTOLOGY;" ONE OF THE AUTHORS OF SEDGWICK AND McCOY'S "BRITISH PALÆOZOIC ROCKS AND FOSSILS;" "PRODROMUS OF THE PALÆONTOLOGY OF VICTORIA," ETC.

PROFESSOR OF NATURAL SCIENCE IN THE MELBOURNE UNIVERSITY.

GOVERNMENT PALÆONTOLOGIST, AND DIRECTOR OF THE NATIONAL MUSEUM OF MELBOURNE, ETC.

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MARY D. BROOK

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MDCCCLXXVIII.

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MDCCCLXXVIII.

1878

PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying

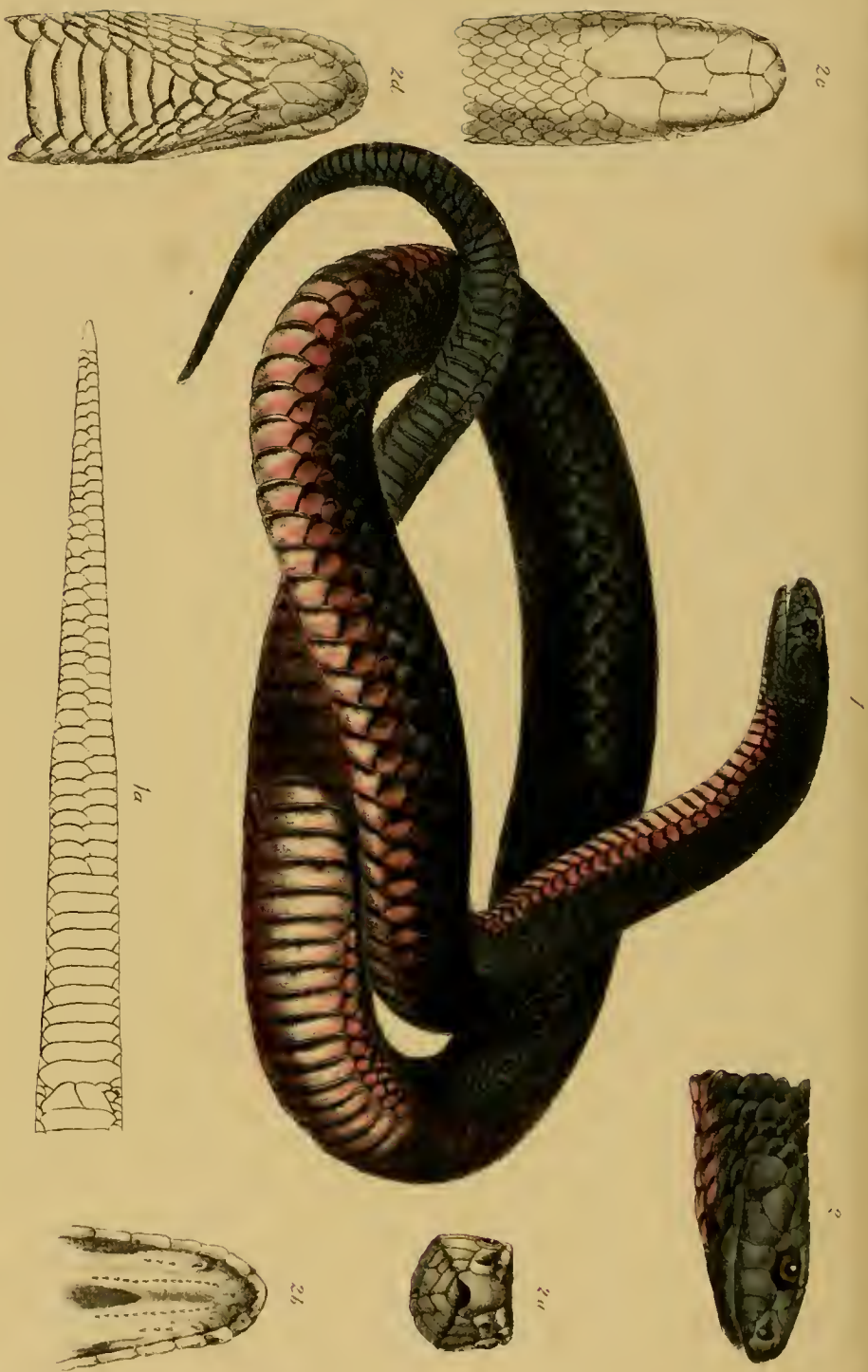
various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This first Decade gives figures and descriptions in the first three plates of three of the most dangerous of our poisonous snakes, which it is of much interest and importance for observers to be able to identify exactly when reporting the effects of their bites, or of the medical treatment, which, to be profitably discussed, must be based on an accurate determination of the species of snake referred to. The three next plates illustrate the living characteristics of some of our native fish. The seventh plate represents the new gigantic earthworm, five or six feet long, so abundant in the rich soils of Brandy Creek. The eighth plate is devoted to three species of day-moth, or *Agarista*, with their transformations, of which that so seriously destructive to our vineyards is discriminated from the harmless sorts, so that efforts for destruction of the one may not be wasted on the others. The last two plates show the character and metamorphosis of two species of diurnal *Lepidoptera*.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

Frederick McCoy.

24th June 1878.



A. Bartholomew. del. E. Gilks lith.

Prof. M^c Coy. direx^t

J. M. Ferguson, imp^r

Printed at the Mining & Geological Depot [illegible] Melbourne

PLATE 1.

PSEUDECHYS PORPHYRIACUS (SHAW SP.).

THE BLACK SNAKE.

[Genus PSEUDECHYS (WAGLER). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapidæ.)

Gen. Char.—Body and tail moderately elongate, gradually tapering. Head subquadrate, flattened above and at the sides, obtusely rounded in front, little wider than the neck behind; no loreal plate; one anterior ocular plate forms the front margin of the orbit, and two posterior oculars its hind edge; two nasal plates with the nostril between them; scales of the back flat, smooth, in about 17 rows; anal plate double, a variable number of the anterior subcaudal plates in one row, behind which they form two rows. Confined to Australia.]

DESCRIPTION.—Scales of back in 17 rows; abdominal plates about 180; single row of anterior subcaudals about 12, posterior ones in two rows of about 40 each; color of head, back, and tail, purplish-black or dark-slate color; the lateral row of body scales on each side and the abdominal plates rich carmine-lake red, with hind tips and edges blackish; the under side of head and the under side of the tail lighter than the back. Length of body about 5 feet, tail about 6 inches, head or gape about 1 inch.

REFERENCE.—*Coluber porphyriacus* (Shaw), Gen. Zool. v. 3, t. 110. *Pseudechys id.* Wagler Syst. Amphib. p. 171.

This is the most beautiful of all the Victorian snakes, and one of the most deadly in the effects of its bite. It is, however, fortunately much rarer in Victoria than in the warmer more northern colonies of Australia; and although not uncommon near the northern Murray boundary it is seldom found in the cooler southern districts, and is not known at all in Tasmania. The only locality near Melbourne where it is not very uncommon is Studley Park, where in the bend of the Yarra the specimen here figured and some others I have seen were killed.

Like the other genera of the family *Elapidæ*, the poison-fang in *Pseudechys* is grooved on the front face for the duct of the poison gland, which opens near the point, and, as in the family generally, there are a few small harmless solid teeth behind the fang in the upper jaw, besides two rows on the palate, and the usual row of small hooked solid teeth on the lower jaws. The anterior series of subcaudal scales being in one row, and the posterior ones in two rows, is a character readily separating the

genus from the allied forms. There are only two species known, the present black and red one, and a brown one, the specific distinction of which is doubted by some observers.

Some fatal cases of snake-bite in man from this species are known, and a large-sized dog will usually die in an hour from the effects of its bite.

When irritated it can flatten and widen the neck by raising some of the anterior ribs.

To show the variations in the numbers of the scales, &c., the following examples from specimens in the National Museum are given, indicating the extreme variations, from 7 to 16, particularly of the single row of subcaudal plates, and the constancy of the rows of scales across the middle of the back.

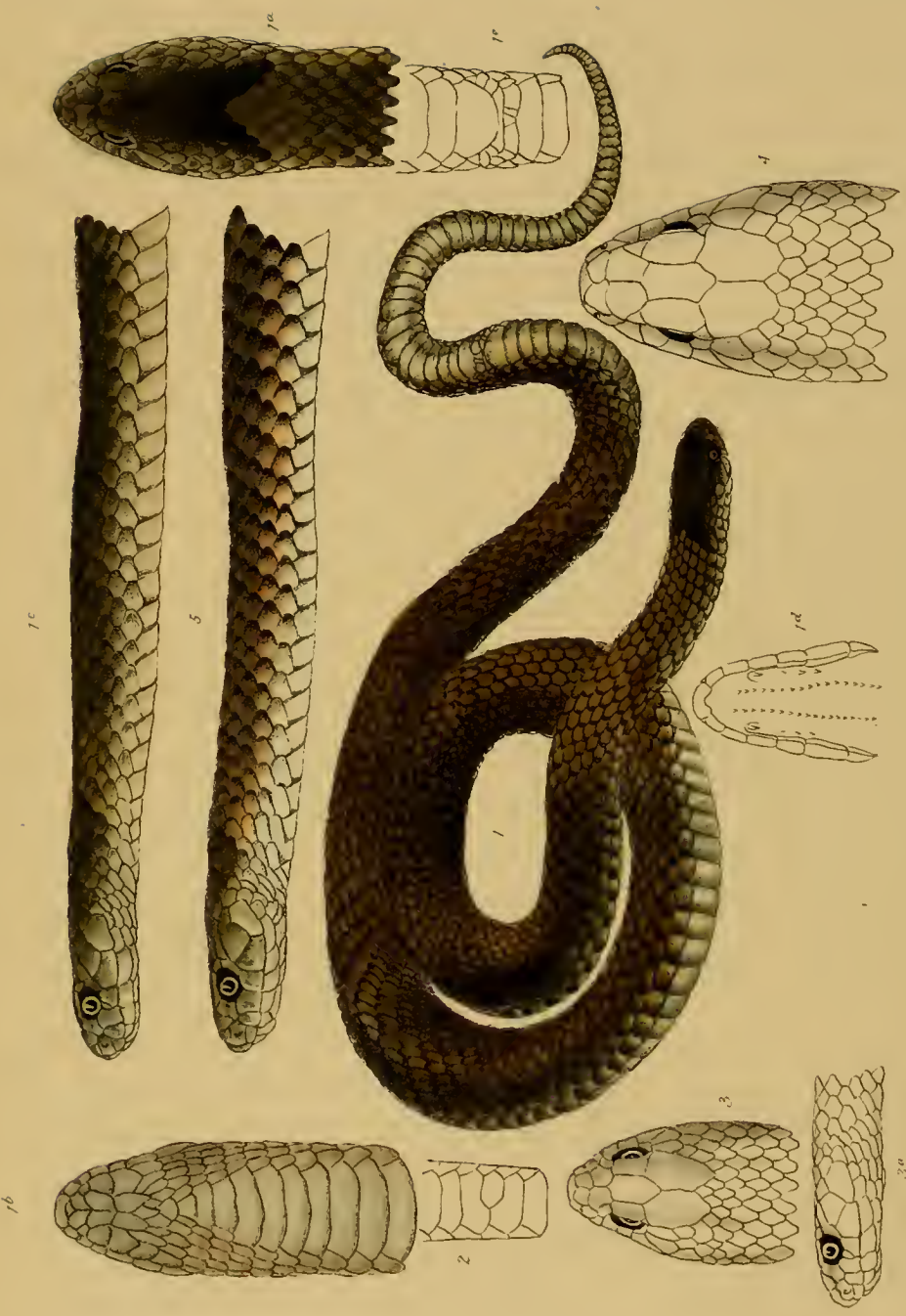
—	Entire Length.	Tail.	Gape.	Subcaudal Plates.	Abdominal.	Rows of Scales across—		
						Neck.	Middle.	Base of Tail.
	ft. in.	in.	in.					
1. Large specimen figured ...	4 $9\frac{1}{2}$	$6\frac{1}{4}$	$1\frac{1}{16}$	$11\frac{35}{35}$	182	21	17	17
2.	4 $9\frac{1}{2}$	8	$1\frac{1}{16}$	$16\frac{39}{39}$	185	21	17	17
3. Small specimen	1 0	2	$\frac{5}{16}$	$14\frac{41}{41}$	182	21	17	17
4.	2 $1\frac{3}{4}$	$4\frac{1}{8}$	$\frac{3}{4}$	$7\frac{43}{43}$	185	21	17	17

The Black Snake may be said to be rare in Victoria, except near the northern boundary. The chief food of this species is formed of frogs, lizards, mice, and other small mammals. It retires into holes in the ground during the winter months, from May, until the warmth of spring brings it forth again. The young are colored like the adult, and are usually about 16 or 18 in number.

Explanation of Figures.

Plate 1.—Fig. 1, large specimen one-half natural size. Fig. 1*a*, under side of tail of same specimen to show the double anal plate, the anterior subcaudal plates in one row, and the posterior ones in two rows, two-thirds the natural size. Fig. 2, side view of head of another specimen, showing the rostral plate, nasal plates, anterior ocular plate, two posterior ocular plates, superciliary plate, and upper and lower labial plates, one-third larger than nature. Fig. 2*a*, front view of same specimen, showing the form of top of the head and rostral plate, one-third larger than nature. Fig. 2*b*, inner view of palate of same specimen, showing the two poison-fangs, with the three small solid teeth behind each, on each side, and the two long rows of small solid teeth pointing backwards on the palate, one-third larger than nature. Fig. 2*c*, same specimen seen from above, showing the form and proportions of the rostral plate, anterior pair of frontal plates, posterior pair of frontal plates, two superciliary plates, pair of occipital plates, and the vertex plate, one-third larger than nature. Fig. 2*d*, same specimen seen from below, showing the chin plates, one-third larger than nature.

Frederick McCoy.



A Barthelomew del

Prof. M'Coy direx.t

F Schuntield lith

PLATE 2.

HOPLOCEPHALUS SUPERBUS (GÜNTH.).

THE COPPER-HEAD SNAKE.

[Genus HOPLOCEPHALUS (CUV.) (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapidæ.)

Gen. Char.—Body and tail moderately thick, gradually tapering. Head subquadrate, depressed, rounded in front; rostral plate moderate; no loreal plate; one anterior and two posterior ocular plates; one nasal plate pierced by the nostril. Scales of back smooth, about 15 to 21 rows; anal and subcaudal plates entire, in one row. Confined to Australia.]

DESCRIPTION.—Vertex plate hexagonal, about twice as long as broad. Fifteen rows of dorsal scales across the middle of the back; ventral plates, 147 to 157; subcaudal plates, 41 to 50 (about); color of back varying from a dark-brown to light reddish-brown, or nearly black, the tip of each scale blackish; top of head of a dark copper blackish bronze, with two diverging darker extensions forming a V-shaped black patch on neck; outer row of scales on each side, with a conspicuous white patch on anterior half of each, the tip being blackish; one or two next outer lateral rows of scales light brick-red for about one-third of their length, the anterior part being lighter and the tip of each blackish. Under side very pale yellowish-olive in front, becoming dark-grey or blackish on middle and tail; hind edge of ventral plates dark-grey and sometimes with a slight reddish line; plates of sides of the head closely freckled with olive-brown, but each with a conspicuous narrow white anterior margin.

REFERENCE.—(Günther) Cat. Colub. Snakes, p. 217.

To show the constancy of the number of rows of scales across the middle of the back, and the variation of the ventral and subcaudal plates, I subjoin particulars of five specimens in the National Museum :—

	Number of Rows of Scales on Back.			Plates.		Total.		
	Neck.	Middle.	Base of Tail.	Ventral.	Subcaudal.	Length.	Tail.	Gape.
						ft. in.	in.	in.
1 specimen ...	13	15	13	147	41	2 5	$4\frac{1}{4}$	$\frac{3}{4}$
2 „ ...	17	15	13	154	44	3 4	$6\frac{1}{4}$	$1\frac{1}{16}$
3 „ ...	15	15	13	154	49	2 0	$4\frac{1}{2}$	$1\frac{1}{16}$
4 „ ...	17	15	13	157	50	3 0	$6\frac{1}{2}$	$\frac{7}{8}$
5 „ ...	17	15	13	152	47	3 8	$6\frac{1}{2}$	...

This species was long supposed to be confined to Tasmania, where it is very abundant; and my first announcement* of its occurrence on the mainland near Melbourne was supposed by subsequent writers on the subject in New South Wales and London to be erroneous; these writers, however, now (without referring to their former criticisms) quote it as an undoubted Victorian species. In point of fact, it is very common about Prahran, Elsternwick, and other south-eastern suburbs of Melbourne, but its range seems very restricted, specimens not having yet been recorded from the north or western parts of the colony. The numerous young are brought forth in December and January.

The blackish examples, especially if the reddish color of the side scales and edges of ventrals is distinct, are frequently mistaken for the Black Snake; but the scales on the under side of the tail being only in a single row throughout, and there being one instead of two nasal plates, easily distinguish them.

A large number of the dangerous cases of snake-bites near Melbourne are due to this species, which for its size is extremely venomous. One remarkable case excited much attention a few years ago, when a station-master named Brown, on the Hobson's Bay Railway at Elsternwick, was bitten by a small individual of this species, which some workmen imagined they had killed, and after carrying it some distance hanging across a stick, threw it upon the platform, when Brown, taking it up, received a small wound in the finger, and shortly showed the usual symptoms of fatal snake-poisoning. In spite of the ordinary remedies, of excision of the bitten part, rubbing ammonia on the wound, ligatures, and sucking the wound, doses of brandy, galvanism, and being walked about by assistants, he was so completely at the point of death that the two surgeons attending him gave him up, his sight being gone, his lower extremities completely paralysed, having dilated pupils, swollen neck and face, and coma, from which he could not be roused. The medical attendants, explaining to his friends that they could do no more, and that his death might be looked for in a few minutes, proposed to try what was then considered the dangerous remedy

* "Recent Zoology and Palæontology of Victoria," International Exhibition Essays, Melbourne, 1866–7.

of injecting strong liquor of ammonia into a vein, as advocated by Professor Halford. On this being done by Dr. Halford, who was sent for, to the astonishment of all present, the man instantly recovered consciousness, the pupils of his eyes contracted, and, sitting up, he recognised his wife and child and friends, and asked some questions about domestic matters, after having been cold, incapable of seeing, hearing, speaking, or moving, and almost pulseless for hours. He soon recovered, and remained on daily duty until lately.*

I have adopted the popular name "copper-head" for this snake from a well-known vendor of a supposed antidote for snake-bites, who used to go about the streets with several specimens of this species in the bosom of his shirt, protruding now and then around his neck. On the evening of the last day on which I saw this, he was induced to cause one of them to bite him, to show the value of his antidote, and was dead in a few hours. The color of the head is like that of an old dark copper coin. In Tasmania the name "Diamond Snake" is unfortunately given to this species, for that name properly belongs to a perfectly harmless snake of New South Wales, so that the numerous experiments made in former years in Tasmania to test the value of some pretended antidote, were supposed in London to have been made with the true harmless Diamond Snake, instead of, as was the case, with this very poisonous kind.

Explanation of Figures.

Plate 2.—Fig. 1, rather light-colored specimen, two-thirds natural size. Fig. 1*a*, head of same specimen, natural size, viewed from above, showing the length and form of the vertex plate, with other plates of the head and the form of the V-shaped dark mark on back of neck, natural size. Fig. 1*b*, head of same specimen viewed from below, showing the chin plates and lower labials, natural size. Fig. 1*c*, side view of portion of same specimen, natural size. Fig. 1*d*, interior of palate of same specimen, natural size, showing the rostral and labial plates, the two long rows of small solid teeth on palate, the two poison fangs, and three smaller solid teeth after an interval behind each. Fig. 1*e*, portion of underside of same specimen, natural size, showing the last ventral plates, the first subcaudals, and the anal plate. Fig. 2, portion of tail of another specimen, natural size, showing an odd intercalated plate on one side. Fig. 3, head of another specimen, natural size, showing the vertex plate more acutely pointed in front than usual. Fig. 3*a*, side view of same specimen, showing the single nasal plate pierced by the nostril. Fig. 4, plates of upper part of head, one-third larger than nature, to show the elongate narrow usual form of the vertex plate. Fig. 5, side view of rather pale reddish specimen, natural size.

Frederick McCoy.

* Some account of this and forty other cases of similarly treated snake-bites will be found in the Australian Medical Journal for March 1875.

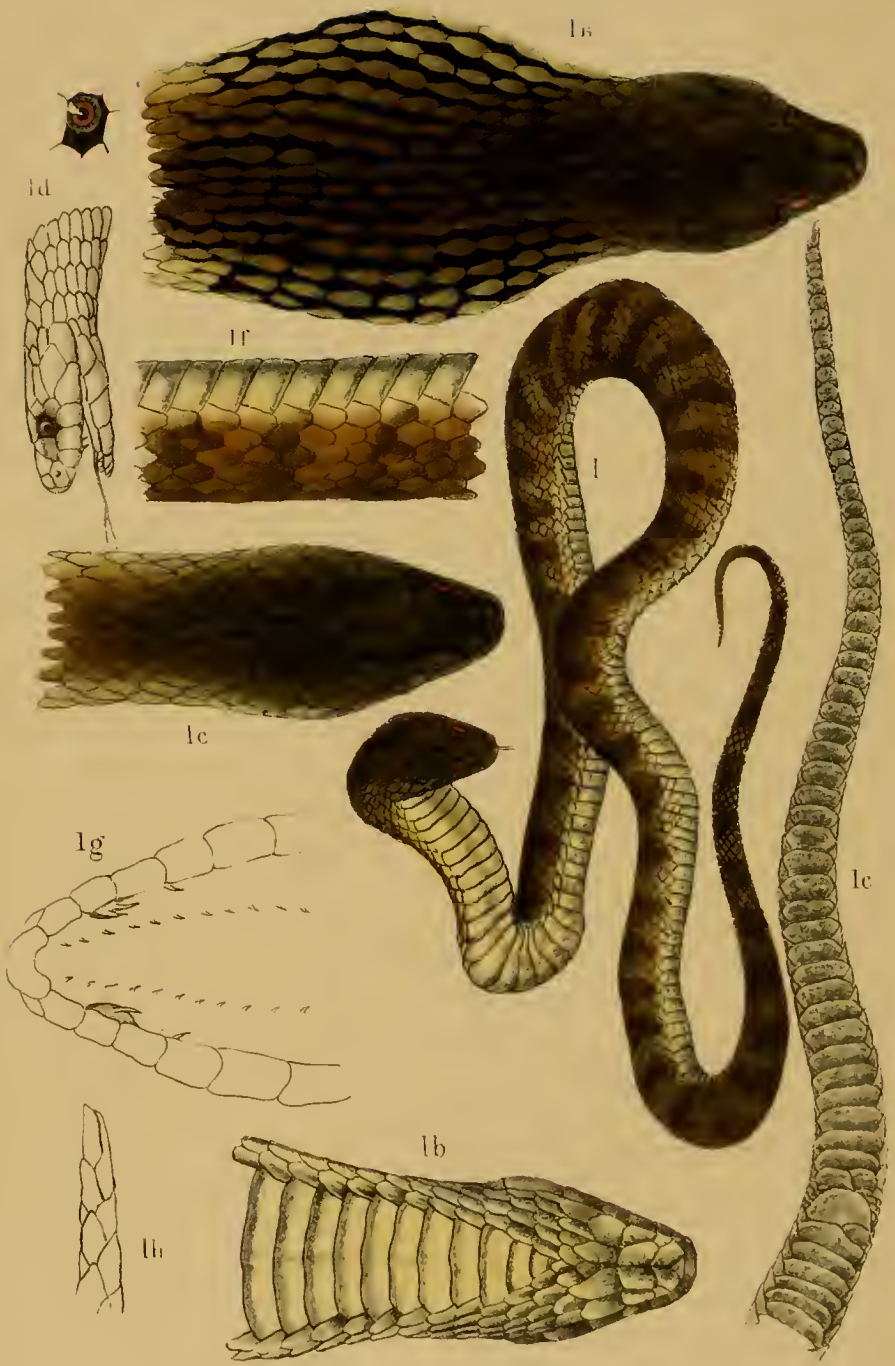

1a
1d
1f
1
1c
1g
1c
1b
1h

PLATE 3.

HOPLOCEPHALUS CURTUS (SCHLEGEL SP.).

THE TIGER SNAKE.

[Genus HOPLOCEPHALUS (Cuv.). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapidæ.)

Gen. Char.—Body and tail moderately thick, gradually tapering. Head subquadrate, depressed, rounded in front. Rostral plate moderate; no loreal plate; one anterior and two posterior ocular plates; one nasal plate pierced by the nostril. Scales of back smooth, about 15 to 21 rows. Anal and subcaudal plates entire, in one row. Confined to Australia.]

DESCRIPTION.—Usually 19 (rarely 17 or 18) rows of scales on middle of body; body varying from brownish-olive to light yellowish-brown above, with about 38 to 50 darker brown dusky undefined transverse bands, about 2 (or rarely 3 or 4) scales broad, with a rather narrower interval between them. Head darker olive bronze; chin plates freckled with bright blue; throat and belly varying from rich king's-yellow to pale straw-yellow; the edges of the ventral plates lightly freckled with grey in the anterior part of the body, the grey almost excluding the yellow and whitish on the subcaudals and posterior part of belly. In some specimens the yellow is almost whitish or cream color, and the grey mottling becomes almost black towards under side of tail. Vertex head-plate sub-pentagonal, varying from one-fifth to one-fourth longer than wide. The belly is flat, and the back obtusely angulated, most so towards base of tail; tail conic.

A large specimen from the junction of the Murray and Darling, with total length from snout to tip of tail of 3 feet $\frac{1}{4}$ inch; length of gape, 1 inch; tail, $5\frac{1}{4}$ inches; has 15 rows of scales at back of neck, 17 at middle, and 14 near base of tail; the subcaudals, 46; ventrals, 168; and about 50 bands. A small specimen from same place—Total length, $13\frac{1}{4}$ inches; tail, $2\frac{1}{4}$ inches; has 15 rows of scales at neck, 17 at middle, and 13 at base of tail; subcaudals, 54; ventrals, 168; and 50 bands. Small specimen from same place—Length from tip to tip, 1 foot $3\frac{1}{4}$ inches; tail, $2\frac{1}{2}$ inches; gape, $\frac{5}{8}$ inch; has 17 rows of scales at neck, 19 at middle, and 15 at base of tail; its bands are as wide as the length of $2\frac{1}{2}$ scales; ventral scales, 168; subcaudals, 50. One moderate sized (the figured) specimen from Prahran, measuring from tip to tip 32 inches; tail, 5 inches; has 17 rows of scales at neck, 19 in the middle, 13 near base of tail, and 49 subcaudals. A very large specimen from junction of Murray and Darling—4 feet 2 inches; tail, $4\frac{1}{4}$ inches; has 4 small teeth behind each fang; vertex plate one-fourth longer than wide, more numerous bands becoming obsolete towards the tail; 15 rows of scales on neck, 17

in middle of body, 169 ventrals, and 36 subcaudals. The details of four other specimens are here tabulated to show observed variations :—

	No. of Rows of Scales on Back.			Ventral Plates.	Sub-caudals.	Total Length.	Tail.	Gape.
	Neck.	Middle.	Base of Tail.					
						ft. in.	in.	in.
1	17	19	15	169	48	3 6	6½	1⅛
2	16	19	15	173	48	3 0	5½	1
3	17	18	13	168	47*	2 4½	...	...
4	18	19	14	178	50	2 5	4½	...
5	18	19	13	169	48	2 8	5	1

* Two imperfectly developed, one between scales 20 and 21; the other between 25 and 26.

REFERENCE.—*Naja curta* (Schlegel), Essai sur la Physionomie des Serpens, p. 486. Abbildung, t. 48, f. 19, 20.

This species, which goes under the colonial name in Victoria of Tiger Snake from its tawny cross-banded coloring, and ferocity, is well-known to frequently inflict bites rapidly fatal to men and dogs, and is extremely vicious in disposition, reminding us strongly of its near ally, the *Cobra di capello* of India, like which it flattens and extends the skin of the side of the neck laterally when irritated, to twice its width when quiet; the black stretched skin being then very visible between the separated scales. It is common, especially in marshy places and near river-banks about Melbourne, and in most parts of the colony, as well as extending far beyond it to the warm north, and just as abundantly to the cool south in Tasmania.

The bands vary very much in distinctness, and are often very obscure towards the head and tail; in some specimens they are rendered very conspicuous by an extension of some of the yellowish color of the belly on to two or three rows of the lateral scales between the ends of the bands. The blue on the chin is rarely seen, and soon disappears in specimens in spirit, exhibiting it when alive. As in all snakes, the colors are most vivid just after casting the skin, and are darker and the markings less distinct before it. The fangs are single or double, small, under the junction of the second and third labial plates; one or two (rarely four) smaller teeth under the anterior part of the fourth labial plate. Iris orange; the pupil seems circular, and not vertically elongate, as Schlegel states in his "*Essai sur la Physionomie des Serpens.*"

In Tasmania this is popularly called "Carpet Snake," a name which properly belongs to the harmless snake so called on the mainland. In this case, as with the *H. superbus*, the Tasmanian experiments on the treatment of bites from this highly poisonous species were unintelligible in Europe from the misuse of the established popular name of a different and innocuous form.

The greater number of cases of fatal snake-bites to men and dogs near Melbourne, and most of the experiments by Professor Halford and others to test the power of the poison, and the efficacy of the injection of ammonia into the blood, and other modes of treatment, refer to this species, which is by far the most abundant of all the dangerous snakes of the colony. In Dr. Halford's experiments at the University of Melbourne, of 31 dogs bitten by captive Tiger Snakes, 27 died and 4 recovered; the deaths occurring, on the average, in 2 hours 2 minutes. Deputy-Inspector-General Macbeth, causing in India 29 dogs to be bitten by Cobras, found they all died, on the average, in 2 hours 42 minutes, showing that, contrary to the expressed opinion of many Indian practitioners, the Australian Tiger Snake bite is more rapidly fatal than that of the Cobra. Dr. McCrae, the Chief Medical Officer of Victoria, caused 14 dogs to be bitten by this species of snake, and none recovered. No remedies were used in any of these three sets of cases. The number of deaths of human beings in the colony from snake-bite in the year is very small; but some of the cases given in the *Australian Medical Journal* for March 1875 are interesting from the bites being publicly given in Melbourne, and the precise times noted both of the bite and the death of the man. One, a police magistrate, bitten on the arm by a Tiger Snake, died in 24 hours; a man named Underwood, a well-known vendor of a supposed antidote, was bitten in public by one of this species, and was dead within an hour; another man named Cartwright, exhibiting some of these snakes, was bitten and also died within an hour. Dr. Casey, of Brighton, reported a case in which the man died within half an hour of the bite; and a man named Griffiths, handling some of these snakes as an exhibition at the Port Phillip Club Hotel, was bitten by a Tiger Snake, and died in less than half an hour. The symptoms seem to be much alike in all cases of snake-bite, viz.:—At first

faintness and often slight convulsions, then sickness of the stomach (probably a reflex action from the brain), with trembling and weakness in the limbs; the pupils of the eyes dilated, a tendency to sleep, and then total paralysis and coma immediately preceding death.

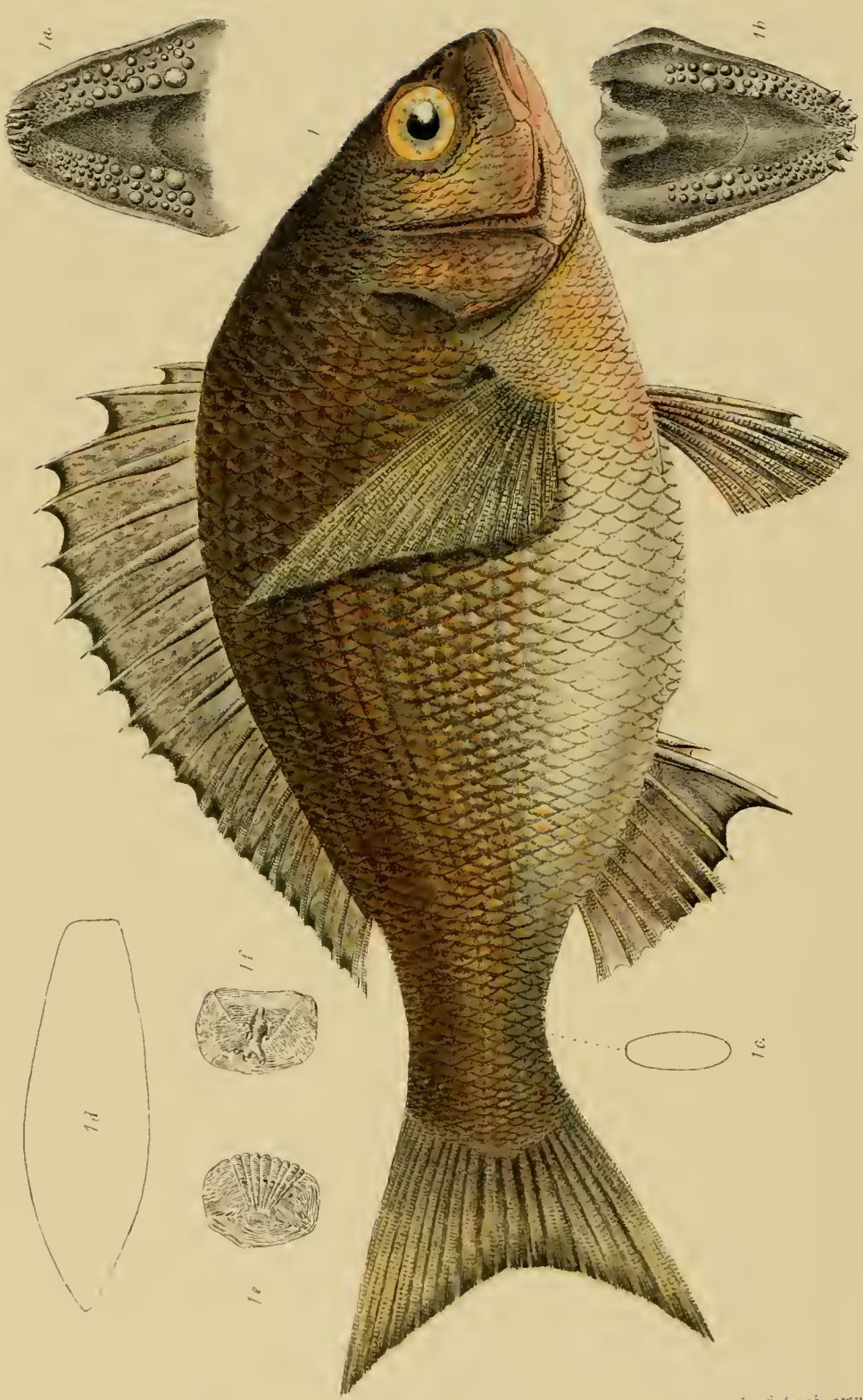
The young of the Tiger Snake are about thirty in number, like the adult in all respects, and brought forth in January. The general food of the Tiger Snake is composed of frogs, lizards, and mice, &c. On one occasion, however, I put a live mouse into a box in which I had a Tiger Snake, to feed it, and was astonished to find next morning that the mouse had killed the snake by biting the back of its neck, and had eaten some of its flesh. Keeping some of these snakes together in a box, I frequently noticed them bite each other viciously when stirred up, without the poison-fangs producing any ill effect.

Explanation of Figures.

Plate 3.—Fig. 1, view of entire of average specimen, half the natural size. Fig. 1*a*, head of same specimen viewed from above when the neck is flattened out, while irritated and preparing to bite, the jet-black skin visible between the separated scales; showing also the wide nearly pentagonal vertex plate, sub-truncate in front and nearly as wide as long. Fig. 1*b*, under side of same specimen, showing the blue freckling and form of the chin plates. Fig. 1*c*, view from above of same specimen when not irritated, the neck being of the usual undisturbed width, and the scales in contact with each other, so as to hide the black skin exposed in Fig. 1*a*. Fig. 1*d*, side view of same specimen, showing the single nasal plate pierced in the middle by the nostril, the anterior ocular, and the two posterior ocular plates, and the large upper and lower labial plates. Fig. 1*e*, under side of tail, showing the single row of undivided subcaudal plates, the anal plate, and a few of the posterior ventral plates, with the bluish-grey freckled coloring of these parts. Fig. 1*f*, side view of portion of same specimen from the middle of the length, natural size, showing the coloring and bands above and the yellow of the under side. Fig. 1*g*, interior of palate, twice the natural size, showing the two long rows of numerous small solid teeth on the palate; the one large poison-fang on the one side and two on the other, together with the single smaller solid tooth on each side behind the poison fangs at an interval of the width of one labial plate. Fig. 1*h*, side view of termination of tail of same specimen.

Frederick McCoy.

Pl. ?



A Bartholomew, del. & lith.

Prof. M.c Coy, direct.

De Gruchy & Leigh, imp.

PLATE 4.

CHRYSOPHRYS AUSTRALIS (GÜNTH.).

THE AUSTRALIAN BREAM.

[Genus CHRYSOPHRYS (Cuv.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Sparidæ.)

Gen. Char.—Four or six conical teeth in front edge of the mouth, and three or more rows of rounded, nearly hemispherical, crushing teeth in upper and lower jaws. Cheeks scaly. The dorsal fin with about eleven or twelve spines, fitting into a deep channel along the insertion of their bases. Anal fin, with the three anterior rays spinous, very strong. Scales moderately large. Six branchyostegal rays. Air-bladder usually notched or lobed. Extends from Atlantic coast of America to Europe and Africa, the Indian Ocean and Pacific.]

DESCRIPTION.—*Fin-rays:* dorsal, 11 spinous, fourth longest, and 11 branched, the two last united at base; anal, 3 spinous, first very short, second longest, and 9 branched (two last united at base); ventral, 1 spinous, 5 branched; pectoral, 14; caudal, 18. *Scales:* lateral line, 55 to 58, 5 rows above and 17 below the lateral line; 5 rows of scales on cheek to angle of preoperculum, 6 rows to angle of operculum from edge of preoperculum. *Proportions:* body ovate, compressed; head small, profile arching gradually from origin of dorsals to tip of snout with slight convexity, and tapering from same vertical of greatest depth gradually to the tail; usual length (of specimen from Gippsland), $12\frac{1}{2}$ inches to end of caudal fin; greatest depth at base of fourth dorsal fin-ray, $4\frac{1}{2}$ inches; thickness, $1\frac{3}{4}$ inches; length of head, 3 inches 1 line; diameter of eye 8 lines (about $4\frac{2}{3}$ in length of head); greatest height of dorsal fin, at fourth spine, 1 inch 4 lines, equal to length from anterior edge of orbit to end of snout; length of third spine, 1 inch 3 lines; length of second, 10 lines; of first, 5 lines; length of pectoral fin, 3 inches 11 lines; first anal spine, 3 lines; second longest, equalling the fourth dorsal. *Teeth:* there are 6 large conical teeth projecting in front of the upper jaw, and 6 slightly smaller below; the outer lateral row above and below more conical than the inner rows, which are hemispherical, about 3 rows below and about 4 rows above, the inner and posterior teeth largest below, the third row largest above. *Color:* the scales of the cheeks, back, and sides, are each minutely dotted with black points on a changing ground of beautifully lustrous green and gold bronze, with occasional bright-blue and copper-red reflections fading into purple, the reddish and blue being predominantly on the cheeks, and the purple on the top of the head; the scales of the belly are of a yellowish pearly-white; there are faint longitudinal streaks of purple or gold, darker or brighter according to the light, extending from head to tail through about the middle third of each scale of the longitudinal lateral rows; dorsal fin yellowish behind, the membrane clouded and freckled with purplish, the margin darker, the spines minutely dotted with brown; anal fin yellowish behind, anterior two-thirds purplish-grey clouded with dark; ventral fins, rays yellowish, minutely freckled with darker, membrane nearly colorless; pectoral fin, rays brownish, membrane nearly colorless; caudal fin, yellowish-olive, with a blackish terminal margin; iris of a gold bronze, with a narrow orange line, and freckled with minute black dots.

REFERENCE.—Günther, Cat. Acanthop. Fishes, vol. 1, p. 494.

The "Bream" of colonists is the chief sport of amateur fishermen, who catch great quantities by rod and line in the brackish water of the mouths of the rivers and creeks, and sea entrances to the Gippsland Lakes, which they enter during the summer months, spawning there about November and December. They go down to the sea again about the end of June, when the cold weather comes on, and may be caught in the sea, commonly about the ends of the piers, with rod and line during the winter months. The bait is usually small fish, or small shrimps or worms. The fish is moderately good for the table, except at spawning time, when the flesh becomes flabby, and the colors dull. The weight rarely exceeds 6 lbs., and is usually much less. The largest specimen I have seen, now in the Museum, is $17\frac{1}{2}$ inches long, but differs in nothing from the above described example in proportion, or numbers of fin-rays and scales. It is from the Mordialloc Creek. Young specimens, $4\frac{1}{2}$ inches long, from Hobson's Bay, agree exactly in the number and disposition of the scales and fin-rays with the largest.

The species has not been figured before.

EXPLANATION OF FIGURES.

Plate 4.—Fig. 1, average specimen, natural size. Fig. 1*a*, inner view of upper surface of mouth, showing the rows of rounded crushing teeth on the sides, and 6 pointed teeth in front. Fig. 1*b*, inner view of lower jaws and tongue, showing 6 pointed conical teeth in front, and the rows of rounded crushing teeth on each jaw, with the clusters of minute intervening ones behind the prominent anterior teeth. Fig. 1*c*, form of section of tail. Fig. 1*d*, form of section from below third dorsal ray. Fig. 1*e*, ordinary scale above lateral line, three times larger than nature. Fig. 1*f*, scale of lateral line, three times larger than nature.

FREDERICK McCOY.

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PLATE 5.

LEPIDOTRIGLA VANESSA (RICH.).

THE SPINY-SIDED BUTTERFLY-GURNARD.

[Genus LEPIDOTRIGLA (GÜNTH.) (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Triglidæ.)

Gen. Char.—Head subrhomboidal, with the top and sides bony, covered with granular ridges; scales of body moderately large (much larger than in *Trigla*); anterior dorsal fin much shorter than posterior dorsal; three long slender pectoral filaments; teeth villiform in numerous rows on both jaws and a few on the vomer, none on the palate bones; air-bladder bilobed in front.]

DESCRIPTION.—*Fin-rays:* dorsals, anterior 10, posterior 17; anal, 15 or 17; ventral, 6; pectoral, 10; caudal, 29. All the rays of the first dorsal and the first four of the second dorsal simple; all the rays of the anal simple except the penultimate one; 3 lower rays of the pectoral simple; first ray of ventrals simple. *Scales:* 5 rows above and 17 to 22 rows below the lateral line, finely serrated at posterior edge; those of lateral line 71, larger than the others and each with one or two large compressed spines; the posterior end of the lateral line branches into two ridges, with about 17 pores on each, running one along the second ray above the middle, and the other along the ray next below the middle. A row of 10 small and about 20 larger spines extends on each side at base from second ray of the first dorsal to the last ray of second dorsal. *Head* with profile concave, snout short, suborbital angles only slightly produced beyond a right angle, with 3 or 4 short spines on each side of the one at the angle, which is half a line long; eye large, diameter two-fifths the depth of the head; head, from snout to tip of opercular spine, one-fourth the total length to upper end of caudal; depth of head vertically under middle of eye equal to length from tip of snout to same vertical line; anterior frontals forming upper anterior quarter of orbits serrated, two of the teeth larger than the others; no spine behind the eye; suprascapular spine, opercular spine, and coracoid spine about 1 line long; space between the orbits very deeply concave, equal to diameter of eye. Third ray of first dorsal longest, five-sixths the depth of body at its base; fifth (or first branched) ray of second dorsal longest, and equal to the fifth ray of first dorsal; pectoral reaching to seventh ray of anal, or second of dorsal; eighth ray of anal longest and equal to seventh of first dorsal. *Colors:* head, back, and upper portion of sides pale dull brick-red, clouded with irregular large darker patches, the darkest of which is on upper base of tail; dorsal fins very pale-brownish, with a reddish tint above; a large rounded blackish spot with an indistinct whitish border extends from the fifth to the seventh ray of the first dorsal, nearer to the upper than the lower ends of the rays; caudal whitish at end margin, red at base, and red rays and purplish membranes at middle; anal and ventral fins opaque whitish or nearly colorless towards the base and pale reddish towards margin; pectoral filaments pinkish-white, slightly chequered with brownish near base; pectoral fins with two or three large black blotches near end of first to third rays on under edge of inner side, the membrane between the rays dull greenish-yellow, with a broad border of intense bright ultramarine blue and numerous irregularly scattered oblong spots of the same color between the rays; outer side of pectorals brownish-pink; chin, throat, and

belly pure white; iris yellow and black, mottled with green. *Teeth:* a small group of 5 small teeth on anterior end of vomer; about 9 longitudinal rows of minute villiform teeth on each side of upper jaw, about 5 rows in lower jaw.

The transverse section of the body shows a deep wide channel along the back, in which the dorsal fins are set, the bounding ridges set with small spines, the sides with a nearly straight slope to the lateral line, which is made prominent by an obtuse angulation, set with the spiny scales, from which the sides and belly are broadly rounded. Plates of the head marked with fine radiating granulated ridges. Opercular spine short. Length, 9 inches 3 lines; depth, 1 inch 7 lines; diameter of eye, 7 lines; length of head, 2 inches 6 lines; pectoral fin, 2 inches 11 lines.

Reference.—Rich. Trans. Zool. Soc., v. 3, t. 5, f. 1.

The comparatively large size of the scales separates the species of *Lepidotrigla* at a glance from the true *Triglæ*, and this character, together with the black blotch on the first dorsal and bright-blue border and spotting of the inner side of the pectorals, easily distinguish the present fish from the other somewhat similar gurnards found in Australian seas. The only specimens I have seen of this beautiful fish were caught in Hobson's Bay in the month of August in different years. It inhabits deep water and feeds on small shells and Crustacea. Like most of the gurnards, it groans or makes a grunting noise when taken out of the water until it dies.

The beautiful coloring of this fish in the fresh state has not been represented before.

Explanation of Figures.

Plate 5.—Fig. 1, side view, eleven-twelfths of the natural size. The pectoral fin in the figure is twisted, to show the beautiful coloring of the inner side, so that the ventral or lower simple rays appear on the upper edge. Fig. 1*a*, head viewed from above, one-twelfth less than the natural size, showing form of anterior end of snout, composed of the spinous ends of the two suborbital bones, and the scapular opercular and preopercular spines. Fig. 1*b*, inside upper view of mouth, showing the small central group of few teeth on anterior end of vomer and the numerous rows of minute villiform teeth on each side of jaw, enlarged one-half more than natural size. Fig. 1*c*, inside view of lower jaw and tongue, showing the fewer rows of teeth on lower jaw, one-half larger than nature. Fig. 1*d*, one of the terminal porous branches of the caudal extension of the lateral line, highly magnified. Fig. 1*e*, scale from lateral line, showing the large median and two smaller vertical pores and the projecting spine, magnified three times larger than nature. Fig. 1*f*, ordinary scale from a little below the lateral line, showing the serration of the posterior margin, three times larger than nature.

Frederick McCoy.

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H.G. De Gruchy & Co. imp

PLATE 6.

TRIGLA KUMU (LESSON AND GARN.).

THE KUMU GURNARD.

[Genus TRIGLA (ARTEDI). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Triglidæ.)

Gen. Char.—Head subrhomboidal, with the top and sides bony, covered with grannlar ridges; scales of body very minute; anterior dorsal fin much shorter than posterior one; three long slender pectoral filaments; teeth villiform in numerous rows on both jaws, and a few on the vomer, none on the palatine bones; air-bladder bilobed in front.]

DESCRIPTION.—*Fin-rays:* dorsals, anterior 9 or 10, posterior 15 or 16; anal, 15 or 16 (last two united at base); ventral, 1 simple and 5 branched rays; pectoral, 10; caudal, about 18 ($11\frac{5}{3}$). *Scales:* along lateral line about 69 to 73, 16 rows above between the dorsals, and about 65 below the lateral line; no spine to scales of lateral line. Snout acutely pointed when viewed sideways; profile nearly straight; concave space between the eyes rather less than diameter of orbit, and only slightly hollowed; vertical diameter of eye about $3\frac{1}{2}$ times in the depth of the head; 2 small spines in front of the eye; 1 suprascapular, 1 opercular, and 2 preopercular spines, small, about 2 lines long; lateral angles of snout, or ends of sub-opercular bones, blunt, nearly rectangular, with small blunt spines, about 5 or 6 in number; a row of 25 spines on each side of the concave channel in which the dorsal fins originate; first dorsal spine little shorter than the second and third, which are longest, and equal to the length from anterior nostril to tip of spine at angle of preoperculum. *Color:* head yellowish on cheeks, purplish-grey above, in front, and behind; back and sides a dull pale cinnamon-brown, with an olive tinge, and with large blotches, irregular in size, shape, and disposition, of a dull indian-red or reddish-brown. Dorsal fins very pale, brownish, and yellowish; anal and ventral fins whitish; 3 pectoral filaments dotted with brown; pectoral fins blackish-green, with reddish rays on outer side; on inner side pale yellowish-olive, with a pale, narrow, greyish-blue margin, with 2 or 3 rows of small oval spots of the same color within the border; a large ovate black blotch between the third and sixth rays from the lower edge, having about five oblong opaque white spots tinged with bluish along its upper edge, and three running down the middle; caudal fin reddish, with brownish rays darker towards the margin; throat and belly pure white. Iris golden yellow. *Teeth:* about 5 rows on upper jaw of 60 each in the length; a transverse arched group of about 35 small teeth on front of vomer; about 4 rows in lower jaw, 50 each in the length. Transverse section of body, with a narrow rounded back, widening towards the belly. Total length to end of caudal, 19 inches; length of head, 4 inches 6 lines; second spine of dorsal, 2 inches $6\frac{1}{2}$ lines; length of pectoral, 5 inches (reaching to third ray of anal and second dorsal); diameter of eye, 9 lines; space between eyes, $9\frac{1}{2}$ lines.

REFERENCE.—Lesson and Garn. Voyage de la Coquille. Poissons, t. 19.

This is a well-known species, occurring in great quantities in the summer months in New Zealand waters, under the name of "Kumukumu," and occasionally visits Hobson's Bay, usually in August. The very small scales, brownish-olive body, and peculiar coloring of inner side of pectoral, render it easy of recognition.

Explanation of Figures.

Plate 6.—Fig. 1, side view, seven-twelfths of the natural size. The pectoral fin in this figure has the upper edge twisted outwards and downwards, so as to display the inner characteristically colored side. Fig. 1*a*, head viewed from the top to show the form of the snout, with the small spines at the end of the suborbital bones, and the small spines in front of the orbit, seven-twelfths of the natural size. Fig. 1*b*, inner view of tongue and lower jaw, showing the tongue and few rows of small villiform teeth on the jaws, natural size. Fig. 1*c*, form of section of body in front of first dorsal ray, seven-twelfths of natural size. Fig. 1*d*, inside view of upper jaw, showing the arched median group of small teeth on the anterior end of the vomer, and the numerous rows of minute villiform teeth on each side of the jaws, natural size. Fig. 1*e*, scale from below the lateral line, five times larger than nature. Fig. 1*f*, another scale from more anterior part of the body.

Frederick McCoy.

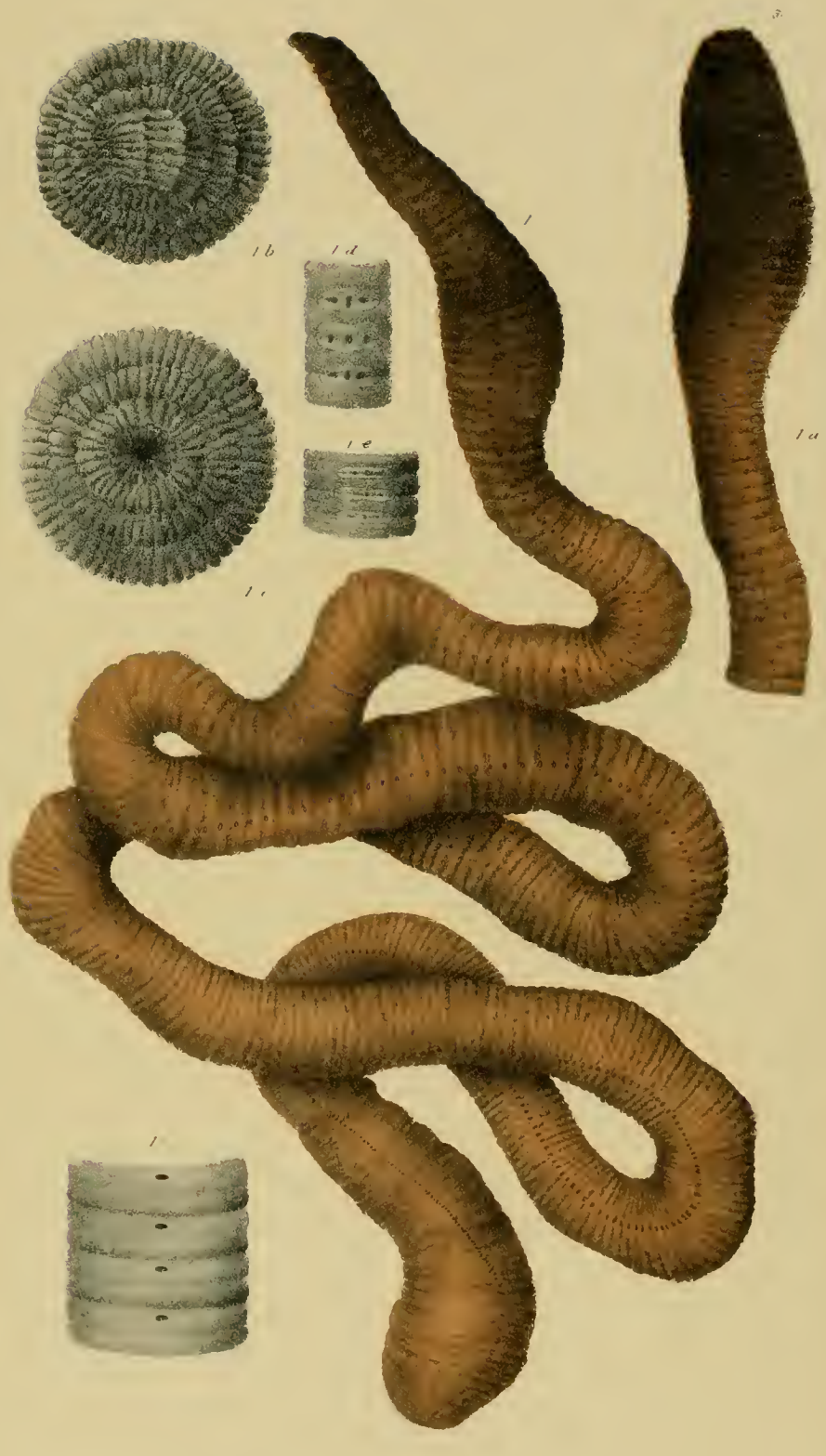
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PLATE 7.

MEGASCOLIDES AUSTRALIS (McCOY).

THE GIANT EARTH-WORM.

[Genus MEGASCOLIDES (McCoy). (Sub-kingd. Articulata. Class Annelida. Order Abranchiata. Section Terricola. Fam. Lumbricidæ.)

Gen. Char.—Body very large, cylindrical, of from 300 to 500 rings, the anterior portion from a little behind the mouth thickest, suddenly narrowing at genital rings, then for some feet a little wider and again dilating slightly at the tail; the prominent middle third of each ring set with 8 very minute spinules arranged in four pairs on the abdominal and lateral two-thirds of each ring, leaving rather less than one-third of the dorsal surface smooth, and forming 8 longitudinal lines along the body from the genital rings. A row of spiracular pores along the mid-line of the back opening on the anterior edge of each of the rings except near the head in front of clitellæ. An imperfect genital, hard, cingulum or clitellæ extending only over the ventral third of about three rings towards anterior tenth of the length; rings near posterior end much narrower and less distinctly marked than at the anterior end.]

DESCRIPTION.—Body of about 350 to 500 rings (about 10 in 1 inch of anterior end when extended, or 14 in same space when contracted, about 16 in same space at middle of body), tapering to each end when extended, but both anterior and posterior ends becoming club-shaped when contracted; a marked narrowing of the body between the 36th and 40th rings behind the clitellæ; anterior end, of about the first 25 to 40 rings, sooty brownish-black, lighter on the ventral fourth of the surface, rest of body, back, belly, and sides alike in color and of a light, brownish flesh-color with a slight purplish-grey reflection; oral and anal apertures central. Between the 32nd, 33rd, and 34th rings from the mouth, on the ventral side, are three genital short bands, less than the rings in thickness and only extending round about one-fourth of the circumference of the body, forming an imperfect cingulum or clitellæ much tougher in consistence and lighter in color than the other parts. About 2 feet long when contracted and about 6 feet long when extended; 8 lines to $\frac{3}{4}$ of an inch in diameter. Spinets or setæ $\frac{1}{30}$th of an inch long and $\frac{1}{500}$th of an inch wide with the exterior pointed end very slightly hooked, general form slender, nearly straight, with a very slight sigmoid curve, subtruncate obliquely at base (more slender and less curved than Vaillant's figure of the setæ of *Perichæta cingulata*, Ann. des Sc. Nat. v. 10, pl. 10, f. 2, or Schmarda's figures of those of the four other species, and nearly agreeing with Baird's figure of *Megascolex* (*Perichæta*) *diffringens*, but rather more slender); each seta projecting from the end of each of 8 minute conical papillæ, the base arising from the prominent middle ridge of each ring, and the apices directed outwards and backwards; the 8 setæ, on successive rings, form 8 longitudinal lines, beginning from the 25th to the 32nd ring, to end of the body, arranged in four pairs, the outer pairs on each side about the length of a contracted ring apart, the ventral pair a little farther apart, and the pairs of rows about twice as far apart as the two rows of the pair; one-third of each ring forms a smooth space along the back of the animal, down the centre of which the breathing spiracles form a conspicuous line of transversely oval pores beginning about the 40th ring, and becoming indistinct before quite reaching the posterior end; the dorsal portion of the rings flatter than the rest and without the longitudinal muscular plicæ or wrinkles on the margins of the ventral and lateral thirds. The mouth is a transverse slit when closed $\frac{1}{4}$ of an inch wide; but when partially open the upper edge has a hard, thickened,

arched margin, closed below by a soft tubular sort of under lip, looking like a portion of the œsophagus everted; the head ring radiatingly granulated outside the opening. The first 30 rings are broader than the others, but each is divided into three by two impressed lines parallel to the margins, making it difficult to count them.

Dr. Templeton, of the Royal Artillery, was the first to draw attention to the existence of enormous earth-worms, 20 to 40 inches in length, and 1 or 1½ inches in thickness, in the alpine region of Ceylon during the rainy season, in a letter sent to the Zoological Society of London, and published in their proceedings of 1845,* for which he proposed the name *Megascolex cæruleus*, from their size and color. They had 270 rings, and the genitalia occupied the 16th, 17th, and 18th rings, after which the diameter was less, and from the 15th ring a row of breathing pores extended along the middle of the back; and 100 setæ on each ring except on mid-line of back.

Schmarda next, in the second part of his admirable work "Neue Wirbellose Thiere," founded the genus *Perichæta* on the character "Setæ totam segmentorum circumferentiam in forma annuli cingentes," and remarks—"Das Geschlecht *Megascolex* wurde von Templeton aufgestellt. Es charachterisirt sich dadurch, dass die Borsten auf dem Rücken in Querreihen in der Mitte der Leibesringe stehen." Now Templeton, on the contrary, states distinctly that in his *Megascolex* there are no setæ on the mid-line of the back at all, but they form a row round the other parts of each ring. Dr. Baird next described† somewhat similar creatures of smaller size, from the earth imported with orchids into some hothouses in Wales (probably from India or South Africa), which he named *Megascolex (Perichæta) diffringens* from the great brittleness of the individuals, and supposing *Megascolex* and *Perichæta* to be synonymous genera. These living specimens were described to him by the gardeners to have different habits from earth-worms, twisting violently about like eels when held (the popular name eel-worm was given to them by Mr. Fish), and travelling by night with great swiftness over the surface of the ground, into which they vanish

* Annals and Magazine of Natural History, vol. xv., p. 59.

† Proc. Zool. Soc. Lond., 1869, p. 40.

with astonishing rapidity when disturbed. Neither Dr. Baird nor other subsequent writers can be justified in uniting the genera *Megascolex* and *Perichæta*, if Schmarda be correct in stating that in his genus the setæ go quite round the body, and in his *P. leucocycla* from Ceylon he even says—"Die Rückenborsten sind etwas stärker als die der Bauchseite." Schmarda is fully borne out in this by Dr. Grube in his description and figure of *Perichæta Tahitensis*, from Tahiti, in his essay on the "Anneliden" in the "Reise der Österreichischen Freggate Novara." Under any circumstances it is clear that our Australian species approaches more nearly to Templeton's genus, and cannot belong to *Perichæta*, which seems distinct from *Megascolex* by its smaller size, much fewer body rings, and fewer and much larger setigerous papillæ. Still, as Templeton says, his *Megascolex* has 100 setigerous papillæ on each ring, while ours has only eight, disposed in four pairs as in *Lumbricus*, I am constrained to use a special generic title *Megascolides* for the present form, and make it the type of a distinct genus, which only differs as far as I know now from *Lumbricus* in its great size, very much more numerous rings, and the clitellæ formed of three separate short bands, not going round the body, but being confined to the ventral side.

The setæ are extremely difficult to see and count, on most specimens, from their extreme minuteness ; a slight brown speck showing under a lens on the lighter flesh-color skin the places of insertion of the setæ and position of the rows in which, after great trouble, I have satisfied myself the setæ are alone developed, is a great help in counting them. But, as I find on most of the rings several other exactly similar brown specks, 15 to 18 on the mid-ridge of each ring, those of one ring alternating irregularly with those of the adjoining rings between the true setigerous ones, forming the four pairs of longitudinal rows, but not really containing setæ, I have a strong impression that these may have been counted as setæ also by Templeton in his *Megascolex*, and it is not impossible that the longitudinal muscular plication (which also is absent on the back) may have been confounded with the slight papillary swellings from which the setæ arise. Furthermore, Dr. Baird, observing that all Schmarda's worms from the same locality as

Templeton's agreed with the introduced one he had examined, in having very numerous distinct papillæ, each with a seta, on each ring, concluded that the *Megascolex* and *Perichæta* were identical, but in the same localities in Victoria in which the present Giant Earth-worm occurs, I also find a true *Perichæta* (*P. Gippslandica*) (McCoy) in abundance, of the much smaller size, fewer rings, and with very numerous large papillæ and setæ going entirely round the rings (visible to the naked eye) of the described species of true *Perichæta.*

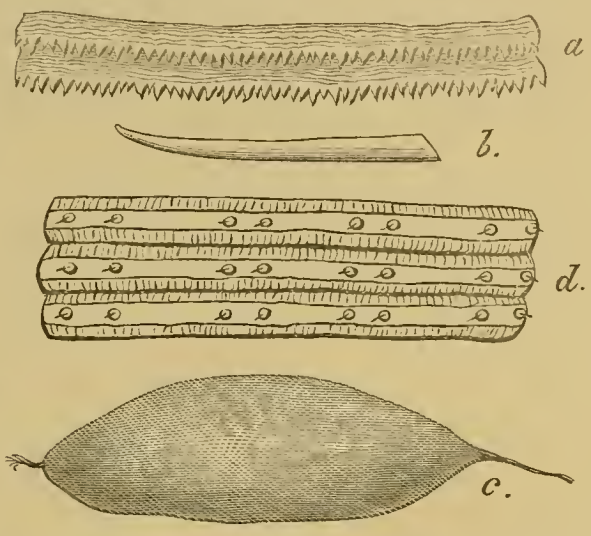
On the first entry of the surveyors into that paradise of land selectors, the Brandy Creek district, on the new Gippsland line of railway, I received from them numerous specimens of this gigantic Earth-worm, with queries as to whether it were a snake or a worm, &c. All of them, from the great diameter of the digestive tube, were almost like small membranous sausage-skins filled with earth, and from their great brittleness each individual was usually received divided into several pieces, the broken ends of which contracted so strongly as almost to close the wound, and decomposition setting in so rapidly that very little of the essential characters could be made out. Although I have more recently examined numerous perfect examples, both living and in spirit, I cannot find any male or female genital pores, such as are so conspicuous in *Perichæta*, the former between some rings on the ventral surface in front of the "cingulum," and the latter behind it.

The living worms emit an odor resembling that of creosote. Like the ordinary earth-worms they burrow in the earth, swallowing the portion in front as they bore downwards, casting the portions from which they have abstracted the nutrient particles on the surface of the ground, renewing the surface by a kind of natural trenching which tends to bury the surface beneath a continual top-dressing of fresh soil from below.

I have recently received from Mr. Search several examples from Queensferry of the oval, tough, horny case or capsule, 2 to 3 inches in length, half an inch wide, and terminated by a bunch of filaments at one end, and a shorter pointed extension at the other, in which the young worm of this species is enclosed, nearly agreeing with that of the common earth-worm of Europe, except

in size. These capsules are greenish and translucent when fresh, but soon become dark-brown and hard in spirit.

A specimen of the thickness of that in the plate will stretch itself along the ground to a length of 6 feet in its exertions to escape, and one of that thickness held up measured 5 feet 10 inches. As has been observed of the *Perichæta*, the two ends remain alive and vigorous in movement long after some inches or feet of the middle may be dead and decomposed, differing in this respect from *Lumbricus*. The settlers remark that fowls will not eat these worms, even when chopped up. When cut they bleed freely an abundance of the bright red blood which distinguishes the *Annelida* so curiously from the lower and higher classes of the invertebrate animals.



a Two rings of dried specimen magnified, showing the irregular conical spinose appearance of the muscular longitudinal bands on ventral and side portions.

b One of the spinules or setæ highly magnified.

d Three rings of body, magnified, showing the eight spinules on the middle ridge of each, the longitudinal muscular plication on the margins, and the disposition of the setæ to form on the successive rings, the four pairs of longitudinal rows.

c Capsule containing the young worm, natural size.

Explanation of Figures.

Plate 7.—Fig. 1, average specimen, natural size, the anterior rings extended, the line of pores being the breathing spiracles (these should not appear on the anterior dark-colored rings in front of the clitellæ). Fig. 1*a*, head of same specimen, contracted; close to the number and letter the three clitellar thickenings may be seen; natural size. Fig. 1*b*, anterior end view, showing the mouth, magnified to twice the natural size Fig. 1*c*, anal termination, magnified twice the natural size. Fig. 1*d*, the three clitellar swellings when extended, natural size (the three slight depressions often seen in each are too strongly marked. Fig. 1*e*, same when contracted (the pit-like marks too distinct). Fig. 1*f*, dorsal view of smooth space along the back, with the median rows of transversely oval breathing pores on the anterior edge of the rings.

Frederick McCoy.

J. Bartholomew del. et lith.

Prof. McCoy, a. cent.

H. & De G. macq. & Co. imp.

PLATE 8, FIGS. 1, 2, 3, 4.

AGARISTA LEWINI (WALK.).

LEWIN'S DAY-MOTH.

[Genus AGARISTA (LEACH). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Heterocera. Fam. Uraniidæ.)

[*Gen. Char.*—Body moderately long and thick. Palpi long, first and second joints depressed, hairy, third joint long, slender, cylindrical, conical at apex, nearly smooth. Antennæ rather shorter than the body, slightly swollen towards the distal end, apex slender pointed, arched outwards.]

DESCRIPTION.—Brownish-black with a slight purple reflection. *Upper side:* anterior wings darkest, three small spots at the base, and four or rarely five larger transversely oblong ones between base and the large curved transverse band, a little beyond the middle, and which reaches two-thirds of the way from the front edge to the abdominal one, of a rich straw-yellow (paler in the male) ; a row of eight small ovate spots parallel to the margin, a row of seven still smaller about as far within the outer row as it is within the margin, and a short marginal band at the apex of a yellowish-white ; posterior wings rich blackish-brown with a slightly marked small yellowish spot nearly in the middle in the male (often absent), large and distinct in the female ; a short marginal pale-yellow band at apex and row of indistinct yellowish-white spots on edge of male, larger in female. *Under side:* anterior wings rich brownish-black with only the marginal apical small band, the central transverse band, and one spot between it and the base, distinctly marked, of the pale-yellow color ; one or two dots at base and a few of the intra-marginal row of dots very slightly indicated, of a yellowish-white. Posterior wings blackish-brown, with the short marginal band at the apex as on upper side, but a very distinct transverse arched yellow band near the middle, extending about half the breadth of the wing from near anterior towards abdominal margin, five or six small dots on the margin, and a concentric row of six or seven smaller ones between it and the medial band, yellowish-white ; all these marks larger on the female. Body blackish-brown, with a few small spots on head and thorax and a conspicuous one on each side of posterior edge of each abdominal segment, pale whitish-yellow ; apex of abdomen, edge of penultimate segment, thighs, and under edges of abdomen, tawny-buff. Legs and antennæ black, the former ringed with whitish-yellow. Length of body, 9 lines in male, 10 lines in female ; width from tip to tip of wings, 1 inch 7 lines in male, 1 inch 11 lines in female.

REFERENCE.—Boisduval. Voy. de l'Astrolabe, p. 176.

This species is figured to complete the plate illustrating the curious genus *Agarista* so characteristic of the Southern hemisphere,

one species of which is so injurious to the imported vines. This species is larger, with broader wings, and much less distinct spots than the *A. Ephyra* of Tasmania, in which the middle spot on upper surface of the posterior wings is always large and distinct. It is not uncommon near Melbourne, the larva feeding on the *Epilobium tetragonum*, which is an abundant weed. The larva is about 17 lines long, and $2\frac{1}{2}$ lines in diameter, of a rich creamy-white color, with numerous small spots of different sizes and transverse lines, irregular in length and undulation, of jet-black; the head, a patch on the neck, and one on the last and antepenultimate segments, buff; the surface with long slender scattered hairs. The pupa is 9 lines long, enclosed in a slight oval cocoon, formed under the surface of the ground, about 11 lines long and 4 lines in diameter, composed of little grains of earth lined with silk. The larva figured assumed the pupa state on the 18th February, and the imago, or perfect moth, emerged on the 7th March following.

The *Agaristæ* constitute one of those anomalous groups having the day-flying habits of the Butterflies, but the antennæ, instead of terminating in a club, as is always the case with them, are terminated in slender points as in the Moths, with a slight swelling in the middle as in the twilight-flying Hawk-moths or Sphinxes. Their transformation and earthy cocoons here figured show their true relations with the night-flying Moths as well as the habit of resting with the wings horizontal (not erect as in Butterflies). The impression given by Lewin, that the cocoon is a thin silky one attached to twigs of trees, is certainly due to some mistake, and the relationship to *Urania* is thus shown to be so remote, that it would be better to separate *Agarista* as a peculiar family, *Agaristidæ*.

Explanation of Figures.

Plate 8.—Fig. 1, upper surface, natural size, of body and wings on right hand of figure; the detached wings on left of figure show the markings of the under side. Fig. 2, larva full grown, natural size, on its common food, the *Epilobium tetragonum*. Fig. 2*a*, anterior portion of larva, magnified. Fig. 2*b*, posterior portion of larva, magnified. Fig. 3, pupa, natural size. Fig. 4, cocoon, natural size.

PLATE 8, FIGS. 5, 6, 7, 8.

AGARISTA CASUARINÆ (SCOTT).

THE LORANTHUS DAY-MOTH.

DESCRIPTION.—Jet-black with a slight brownish tinge. *Male—Upper side:* anterior wings with four irregular transverse bands (with a very slight subdiscoidal spot between the second and third), and a narrower one nearer the outer margin, extending from the anterior to the abdominal edge, undulated so as to form two salient angles towards the outer margin, with semicircular curve towards the base between them, all of a clear sulphur-yellow; outside the undulated band are seven or eight narrow, clear white, radiating streaks on the nerves; the margin with a narrow interrupted white edge. Posterior wings with a continuation of the sulphur-yellow undulated band crossing rather nearer the margin than the base, with one distinct angular inflection towards middle of the margin, wider and slightly undulating thence to the abdominal margin; within this band is a triangular median sulphur-yellow spot, and two very faint-greyish ones a little nearer the base; margin with a narrow interrupted pure white edge. *Under side:* anterior wing having the spotted white edge, the white radiating neural lines, the sulphur-colored undulated band, the next short transverse band, and the large submedian band as in the upper surface, but within this there is only one triangular spot, and there is a yellow band on the anterior margin from base to upper end of median transverse band; posterior wings with white interrupted margin as on upper surface, but with about five slender white radiating streaks on the veins between it and the undulating sulphur-yellow band, which agrees with upper surface, the next triangular spot being extended into a band constricted in the middle, the upper end of which is continuous with a broad marginal band extending to the base; within this are two large yellow patches appearing only as small faint spots on upper side. Head, body, and thorax black, two narrow pale-yellow lines on upper side of head, and three on the thorax; tip of abdomen and thighs bright rufous; legs black, the joints edged with white. Length of body, 1 inch; width from tip to tip, 2 inches 5 lines. *Female* larger, but almost identical with the male in coloring. Length of body, 1 inch; width from tip to tip, 2 inches 6 lines. The *larva* is about 2 inches long and 3 lines in diameter, of a jet-black with numerous unequal, irregular transverse creamy-white lines, irregularly set with long slender white hairs; the head and upper part of next segment rusty-buff, the penultimate segment at posterior end cinnabar-red. Pupa 11 lines long, nearly destitute of any cocoon covering, under the surface of the earth near roots of trees.

REFERENCE.—Scott, Lepid. Ins. N. S. Wales, t. 8.

This is the largest and finest species of the genus in Victoria, and perfectly harmless. The species is named *Casuarinæ* by Mr. Scott, but in Victoria it never feeds on the *Casuarina* but always on the *Loranthus*, or so-called Native Mistletoe, which is parasitic

on the Gum Trees (*Eucalyptus*), on which I have figured it. It is comparatively rare about Melbourne.

EXPLANATION OF FIGURES.

Plate 8.—Fig. 5, male, natural size, the left hand-disconnected pair of wings showing the coloring of the under side. Fig. 6, female, natural size, the left disconnected pair of wings showing the under side. Fig. 7, larva, natural size, on the natural food, the *Loranthus*. Fig. 8, pupa, natural size.

PLATE 8, FIGS. 9 TO 13.

AGARISTA GLYCINE (LEWIN SP.).

THE VINE DAY-MOTH.

DESCRIPTION.—Rich brownish-black, with a slight purplish reflection. *Male*—*Upper side:* anterior wings, with three or four narrow obliquely transverse angulated pale greyish-yellow lines; one broader short subtriangular or oblong spot between them and the broad transverse discoidal band, which is strongly undulated or angularly indented at the sides, both of a sulphur-yellow color; beyond the band are seven or eight radiating narrow yellowish-white lines coinciding with the veins; a small narrow short marginal band of pale-yellow at apex; posterior wings with distinct yellow spot near middle, and a narrow pale-yellow edge to the margin. *Under side:* anterior wings, with the narrow transverse basal lines obsolete, but the yellow trigonal spot and transverse band larger than on the upper side, the whitish radiating neural striæ less distinct than on upper side; posterior wings, with a broad lunate yellow band in middle, the upper end curving along the anterior margin to the base, the edge margined with pale-yellow; between the disc band and the margin a concentric row of seven or eight slightly-connected small pale-yellow spots. Head, body, and thorax black, with five narrow longitudinal pale greyish-yellow lines on the thorax, and two on the head; posterior end of abdomen rich rusty-buff, as well as the upper edge of penultimate segment and under edges of other segments and the thighs; feet black, ringed with white; length of body, 8½ lines; width from tip to tip, 2 inches. *Female* larger and with broader wings than the male, but identical in coloring of upper and lower surfaces with the male, except that there is no yellow spot in middle of upper surface of posterior wings; length of body, 10 lines; width from tip to tip, 2 inches 2 lines.

Larva about 2 inches in length and 2½ lines in diameter, of a greenish-yellow color, closely marked with very numerous transverse interrupted and irregularly undulated lines and polygonal spots of jet-black, with numerous scattered long slender white hairs; the head and next segment fulvous-brown, spotted with black; the antepenultimate segment with a row across the back of four large quadrate carmine red spots. *Pupa* about 11 lines long and 3 lines in diameter. Enclosed in an oval *cocoon*, formed of particles of earth outside lined with silk inside; the whole so light that the pupa can be seen through it. About 1 inch 3 lines long, and 6 lines wide.

REFERENCE.—Phalænoides glycine. Lewin Lepidop. Ins. N. S. Wales, t. 1. Agarista id., Boisduval Voy. de l'Astrolabe, p. 175.

This species received its specific name from Lewin observing that in New South Wales the larvæ fed on the leaves of the leguminose plant, the *Glycine bimaculata*. In this colony, however, it is generally called the Vine-moth, from one of the most extraordinary changes of habit ever recorded in any insect. In the early days of this colony, before the introduction of the vine, the larvæ of this insect fed on the *Gnaphalium luteoalbum*, which is a very common weed, but since the planting of vineyards the *Agarista glycine* has increased enormously in numbers, and *has totally abandoned its original food to devour the leaves of the grape vine*, never now touching the former, but thriving and multiplying beyond measure on the foliage of so totally dissimilar a plant, that if the perfect female Day-moth be guided by ordinary instinct to choose that plant on which to deposit its eggs on which the larvæ might find suitable foliage for food (the perfect insect not only being deprived of jaws fit for eating leaves itself, but being separated from the foliage-eating larval stage of its existence by the intervening pupa stage, in which feeding, motion, and the senses are all stopped), it is not possible to conceive or understand how the egg-laying Day-moth could have gained such knowledge of the properties of the Vine as would induce it to abandon the natural food (not of itself, but) of its larvæ, and to put its trust in a foreign plant of which one might suppose it could know nothing.

There are two or three broods in the year, the first brood of larvæ appearing about the end of October, or when the vines begin to come into leaf, and after a few weeks enter the pupa state, about beginning of December, the moth coming out about the end of December, while the larvæ figured descended into the earth, formed their earthen cocoons beneath the surface at the end of March, and the perfect imago came out on the 18th of May.

I cannot understand Lewin's statement and figure of a light cocoon of thin silk attached to twigs of trees for this species, for in this colony it invariably forms a slight cocoon of earth below the surface of the ground.

The injury done to the vines in the extensive vineyards of Victoria by the larvæ of this species is enormous, and seems to be increasing. Their numbers are altogether too great to be dealt

with by any other means but hand-picking, and there are not hands enough in the country yet for that, as the children by law must attend school. The Acclimatisation Society acclimatised the Indian Minah in the hope that, besides destroying the Grasshoppers and Locusts (which they do admirably), they might diminish this pest also; but they have unfortunately developed a taste for eating the grapes, and do not seem to like the larvæ of the *Agarista*. Before the new school law, children used to be employed thinning the numbers of the larvæ in an unpleasant but effective manner, by cutting each one across with a pair of scissors as they walked along the rows of plants, instead of delaying to pick them off. Even this sharp and decisive proceeding is too tedious to keep down their numbers, and, to add to the difficulty, the fowls even will not eat them, nor any other creature as far as I know. The only suggestion I can make is to employ hand-pickers at the time of the approach of the first brood of caterpillars, when the vines come first into leaf. Each one killed then prevents the formation of multitudes, as well as gives strength to the plant by their present removal. The next object of attention should be to kill all the moths of the first brood found on the wing, the figure here given rendering the right one easy of recognition, and this for each one killed will destroy myriads of eggs which would form the second brood.

EXPLANATION OF FIGURES.

Plate 8.—Fig. 9, male, natural size; the right pair of wings attached to the body represent the upper surface, the left-hand pair (separated from the thorax) represent the markings of the under surface. Fig. 10, female, natural size, the right-hand attached pair of wings showing the upper side, the left-hand detached ones showing the under side. Fig. 11, larvæ, natural size, on their newly adopted food, the vine-leaf. Fig. 11*a*, head and anterior segments, magnified. Fig. 11*b*, posterior end, magnified. Fig. 12, the pupa, natural size. Fig. 13, the earthy cocoon.

N.B.—In some impressions of this plate the black is too pale.

FREDERICK McCOY.

Drawn by A Bartholomew
Chevalier Lith

Prof. M'Coy direct

J. H. Ogilvie imp

PLATE 9.

PIERIS (THYCA) HARPALYCE (DON.).

[Genus PIERIS (BOISD.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Rhopalocera. Fam. Pieridæ)

Gen. Char.—Larva cylindrical, moderately elongated, tapering towards both ends, covered with scattered small hairs, slightly granular. Head small, rounded. *Pupa* angulated, slightly compressed, sometimes tuberculated, terminating anteriorly in a slender projection; attached by the tail and a transverse silk line at various inclinations from horizontal to nearly vertical. *Imago:* Head small, hairy, eyes moderate. Palpi rather longer than the head, slightly compressed, clothed with long stiff hairs, the last joint slender, scaly, about as long as the second. Antennæ of moderate length with an obconic club usually compressed. Thorax moderate, clothed with long hairs. Anterior wings subtriangular; subcostal nerves from 2 to 4 branched, upper discoidal nerve united to the subcostal for some distance beyond the cell. Posterior wings obovate, discoidal nerve forming a third median nerve, inner margin forming a very distinct channel for the reception of the abdomen. Legs moderate; claws deeply bifid. Paronychia shorter, broad, subtriangular; pulvillus as long as the claws, jointed. Abdomen rather slender, shorter than the posterior wings.

Sub-genus *Thyca* (Wallengren). Only one subcostal nerve given off before the end of the cell, the first being absent. *Larvæ* with moderately long scattered hairs. *Pupæ* very spinous along the ventral surface.]

DESCRIPTION.—*Female:*—Width of wings from 2 inches 7 lines to 3 inches 2 lines. Wings of a greyish-white, with a slight greenish or yellow tinge, having a black border, varying very much in width, broadest at the angles of the upper wing, with 4 to 6 whitish spots of a lighter color than the centre of the wing between the nervures, the corresponding spots on the under side being of a fine king's or gamboge yellow, usually 6 in number; the ground color of the under wing is of a dark-grey with the black margin sometimes reaching considerably within the discoid cell, the tip of which is then marked with a light spot, the color of the middle, or a black spot is seen inside the discoid cell when the black margin does not reach it; the base is black; hinder wings rounded, having a broad black margin and yellowish-grey base on the upper side, on the lower side having a row of 6 or 7 large black spots round the margin, with 6 or 7 large bright vermilion red spots forming a sinuous row, separated from the black margin by a narrow light-greyish interval which is continued along the nerves so as to separate the black margin into spots; this same light-grey forms a large spot at the end of the discoid cell between which and the red band is a large black spot, a black band about as large as the red one being in contact with it on the other parts of its basal edge; on the basal margin of this black band is another greyish band leaving the base intensely black except near the anterior margin, which is marked by a large vermilion spot; thorax and abdomen greyish above, yellow below; legs and feet black. *Male* generally smaller than the female, from 2 inches 8 lines to 3 inches 1 line wide; upper surface much purer white than in the female, with much narrower black margin and smaller white spots in the black near the tip usually 4 or 5 in number, the under side agreeing nearly in color with the female except that the abdomen is whiter.

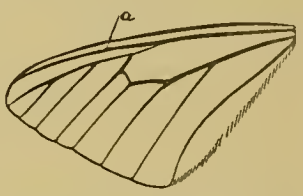
Larvæ nearly smooth, thick, cylindrical, with small head of a dark-brown color, with thinly scattered, rather short white hairs.

Pupa about 1 inch 2 lines long, of a brownish-black glossy surface, carinated along the ventral aspect, without spines on the thorax, with the six anterior segments of the abdomen forming spines slightly arched forwards, with usually a

group of three similar ones on each side of the base of the abdomen; anterior point of the head produced into a slender stem in front of base of antennæ, about 1 line long, terminating in a bifid fork arched downwards; the pupæ are fixed in groups of about 40 or 50, closely packed communities attached to a sheet of white silk web often 1 foot or more in length and 6 or 8 inches wide, binding together several of the terminal twigs of the *Casuarina* or she-oak tree which they frequent, each individual being fastened by the tail and a thread across the anterior part of the abdomen at various inclinations from the horizontal to vertical with the head up.

REFERENCE.—*Papilio Harpalyce* (Don.), Epit. Ins. N. Hol., t. 18; *Pieris, id.* (Boisd.), Sp. Gen. Lep., p. 458.

The family *Pieridæ*, including the majority of "white" butterflies, like the family *Papilionidæ*, has the six legs perfectly developed, but the former differs from the latter in wanting the spines on the anterior tibiæ. The sub-genus *Thyca*, to which the present beautiful species of the old genus *Pieris* belongs, is readily distinguished from the other divisions of the genus by having only one subcostal nerve, marked *a* in the woodcut, given off before the end of the discoid cell. It is a remarkable circumstance that Doubleday and Westwood state that none of the pupæ of the family *Pieridæ* are ever bifid in front, while the present species and the *T. Aganippe* figured on our next plate have the anterior process most distinctly forked and arched downwards. There are two broods of this species in the year, one appearing towards the end of August and the other towards the end of February, remaining about sixteen days in the pupa state; the larvæ are found on the weeping species of *Casuarina* and feed on the parasitic *Loranthus* found growing upon it.



Neuration of anterior wing of P. T. Harpalyce; the letter *a* marking the characteristic single subcostal nerve.

The present species is remarkable for the extraordinary habit of spinning a large white silken sheet like a tough cobweb on which to attach the pupæ in large groups of very numerous individuals closely placed side by side.

As Mr. Wallace has noted that certain islands north of Australia have the individuals of the species of white butterflies distinguished from the individuals of the same species found in other islands by the greater or less angularity or acute pointing of the tip of the upper wing, it is interesting to note that in this species, although

the upper wings of the male are more angulated or less rounded than in the female, yet the amount of straightening of the outer edge and consequent angularity varies in different individuals of the same brood.

Common everywhere in Victoria, flying at moderate heights about the she-oak trees (*Casuarina*), and occasionally visiting gardens.

Explanation of Figures.

Plate 9.—Fig. 1, male (rather large specimen), natural size, upper surface. Fig. 2, female, natural size. Fig. 2*a*, under surface of same specimen. Fig. 3, larva slightly thickened, about to assume the pupa condition, natural size. Fig. 4, sheet of silk web with group of pupæ from which the insects have emerged, natural size. (The natural position of this is got by turning the left side of the plate upwards so that the pupæ are nearly horizontal with the head a little higher than the tail.)

Frederick McCoy.

Drawn by A. Bartholomew
T. Schonfeld Lith.

F. M. Cay del. et lith.

J. Ferguson Imp.

PLATE 10.

PIERIS (THYCA) AGANIPPE (DON. SP.).

[Genus PIERIS (BOISD.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Rhopalocera. Fam. Pieridæ.)

Gen. Char.—*Larva* cylindrical, moderately elongated, tapering towards both ends, covered with scattered small hairs, slightly granular. Head small, rounded. *Pupa* angulated, slightly compressed, sometimes tuberculated, terminating anteriorly in a slender projection; attached by the tail and a transverse silk line at various inclinations from horizontal to nearly vertical. *Imago:* Head small, hairy, eyes moderate. Palpi rather longer than the head, slightly compressed, clothed with long stiff hairs; the last joint slender, scaly, about as long as the second. Antennæ of moderate length, with an obconic club usnally compressed. Thorax moderate, clothed with long hairs. Anterior wings suhtriangular; subcostal nerves from 2 to 4, branched, upper discoidal nerve united to the subcostal for some distance beyond the cell. Posterior wings obovate, discoidal nerve forming a third median nerve, inner margin forming a very distinct chanuel for the reception of the abdomen. Legs moderate; claws deeply bifid. Paronychia shorter, broad, subtriangnlar; pulvillus as long as the claws, jointed. Abdomen rather slender, shorter than the posterior wings.

Sub-genus *Thyca* (Wallengren). Only one subcostal nerve given off before the end of the cell, the first being absent. *Larvæ* with moderately long scattered hairs. *Pupæ* very spinous along the ventral surface.]

DESCRIPTION.—*Male:*—Anterior wings: above bluish-white, with a black moderately wide border, reaching the posterior margin, and divided by a series of about seven or eight irregularly ovate bluish-white spots; anterior edge black; a black spot near distal end of discoidal cell, having a large bluish-white spot within it, separated by about its own diameter from the black of the border; under side nearly like the upper, but two or three of the spots near the tip are rich dark-yellow, and the white near costal margin is tinged with yellow, and there is a black spot near the middle of the inner margin, not seen on the upper surface. Posterior wings: above bluish-white, with a moderately wide black border ending in a point a little beyond the angle; about six large white marginal spots, the anterior three of which only are surrounded with the black at their inner edge; under side black, with a row of six or seven ovate white spots round the margin, each with a dash of pale reddish; a broad irregularly interrupted yellowish-white band in the middle, and a spot of vermilion-red at the base; thorax and abdomen greyish-white; a spot of rich yellow near middle of anterior margin, a larger patch along the ventral margin, and two or three small ones near middle of wings of same rich dark-yellow; width from tip to tip about $2\frac{1}{2}$ inches; margin $\frac{1}{8}$ of an inch more or less.

Female:—Anterior wings: above pale yellowish-white, with the black border much wider than in the male, with the discoidal spot much larger and confluent with the black of the border below, and the enclosed white spots larger; one rounded black spot near middle of posterior or abdominal margin, and a narrow oblong one between it and the discoid spot; under side like the upper, but the three spots near the apex rich yellow and the white near the anterior margin tinged with yellow. Posterior wings: above yellowish-white, marked as in the male, but the black border wider and the spots larger and tinged with reddish at the outer part, leaving the inner crescentic edge conspicuously whiter; under side nearly as in the male, but a spot of vermilion red at base, an oval vermilion spot on outer part of each marginal spot leaving the crescentic white inner edge of each spot very conspicuous; a spot near middle of anterior margin, three small ones near the middle of wing, and a larger patch along the abdominal edge, rich yellow. Body as in male in color; width from tip to tip, about $2\frac{3}{4}$ to $3\frac{1}{4}$ inches.

Larva, about $1\frac{1}{2}$ inches long, of a dark chocolate-brown, dotted with white and set with long white hairs. The specimen figured went into pupa state on the 22nd of January.

Pupa, about $\frac{9}{10}$ of an inch long, dark-brown, mottled with white; attached by the tail to stems of *Loranthus* leaves, with the head maintained in an upward position by an oblique silk thread girding the thorax and fixed to the twig. The imago emerged from the pupa figured, on the 15th February.

Reference.—Don. Epit. Ins. N. Holl. t. 30.

The larvæ of this species feed on the leaves of the *Loranthus*, or Native Mistletoe as it is called, which clings parasitically to the lofty branches of the so-called Gum Trees (*Eucalypti*), and the pupa differs completely from that of the *Thyca Harpalyce* in being solitary.

This species is not so common as the *Thyca Harpalyce*, and has a rather swifter, although slow, flight, and keeps for the most part about the tops of the Gum and "Wattle" trees (*Acacia*), and on the so-called Native Cherry (*Exocarpus*), on the leaves of which the larva feeds as well as on the *Loranthus;* rarely approaching the ground level. There are two broods in the year, remaining in the pupa state about three weeks, varying according to the weather; a few of the last brood continue in the pupa state over the winter, the butterfly appearing in the spring. The males seem to be scarcer than the females, and are always smaller.

Explanation of Figures.

Plate 10.—Fig. 1, male, upper side, natural size. Fig. 2, female, upper side, natural size. Fig. 2*a*, female, under side, natural size. Fig. 3, pupa, natural size, showing the habit of attaching itself singly to twigs near tops of trees by the tail, and supporting the head in an upward direction by the fine silk thread slung round the body. This figure shows the bright coloring shortly before the escape of the butterfly, the colors being duller before. Fig. 4, larvæ, full size.

Frederick McCoy.

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N.B.—The originals of all the Figures are in the National Museum, Melbourne.

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MARY D. ROGICK

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE II.

BY

FREDERICK McCOY,

HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
PROFESSOR OF NATURAL SCIENCE IN THE MELBOURNE UNIVERSITY.
DIRECTOR OF THE NATIONAL MUSEUM OF NATURAL HISTORY AND GEOLOGY OF MELBOURNE, ETC.

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Natural History of Victoria.

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FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE II.

BY

FREDERICK McCOY,

HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
PROFESSOR OF NATURAL SCIENCE IN THE MELBOURNE UNIVERSITY.
DIRECTOR OF THE NATIONAL MUSEUM OF NATURAL HISTORY AND GEOLOGY OF MELBOURNE, ETC.

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PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers

in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This second Decade gives figures and descriptions in the first plate of two species of poisonous snakes too small to be dangerous to human life, but often causing needless alarm from being mistaken for the young of larger sorts. The second plate shows the famous Death Adder, reputed the most deadly for its size of all our poisonous snakes, and remarkable for the stinglike spine at the end of its tail, which is popularly mistaken for its dangerous wounding part. The third plate represents the largest of our Victorian serpents, the great Carpet Snake, sometimes eight to ten feet long, but, like the nearly related Boas of America and the Rock Snakes of Asia and Africa, perfectly harmless as far as the bite is concerned, as there are no poison fangs. The fourth plate represents for the first time the Gippsland Perch, now common in the markets. The fifth gives the large Murray Crayfish, or Lobster, as it is popularly called. The sixth and seventh plates illustrate the different forms and colors peculiar to the different stages of growth of the Arripis, popularly mis-called Salmon and Salmon Trout by the fishermen ; to which so many cases of fish-poisoning have given a special interest, as well as its size, abundance, and general wholesomeness for food. The eighth plate gives proof of the identity of our Horse Mackerel with that of Europe and America. The ninth and tenth plates represent for the first time two species of the food fishes popularly called Rock Cod.

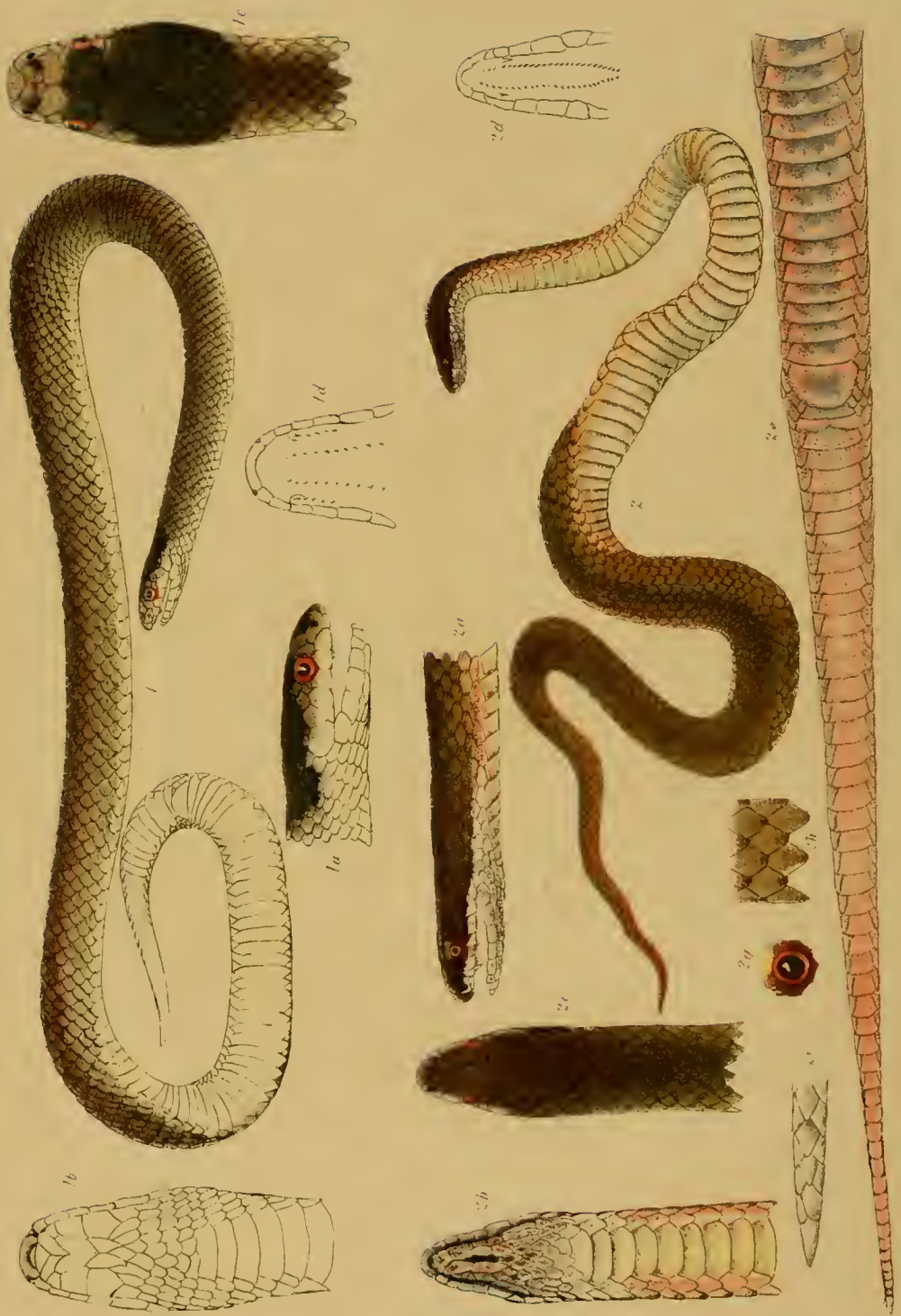
An unusual proportion of this Decade has been devoted to our fishes at the request of the Inspector of Fisheries, whose functions cannot be efficiently carried out in a new country without some

such means as our illustrations afford for the accurate identification of the fishes referred to in the regulations of that branch of the Service, and concerning the habits and time of spawning of which the local inspectors are required to report.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

2nd October 1878.



Drawn by a Barthelmess. F. & M. Grey direx.t F. Schanfeld. lith

PLATE 11, FIG. 1.

HOPLOCEPHALUS FLAGELLUM (McCOY).

THE LITTLE WHIP SNAKE.

[Genus HOPLOCEPHALUS (CUV.). (Class Reptilia. Order Ophidia. Fam. Elapidæ.)
Gen. Char.—Body and tail moderately thick, gradually tapering. Head subquadrate, depressed, rounded in front. Rostral plate moderate; no loreal plate; one anterior and two posterior ocular plates; one nasal plate pierced by the nostril. Scales of back smooth, about 15 to 21 rows. Anal and subcaudal plates entire, in one row. Confined to Australia.]

DESCRIPTION.—Head considerably wider than the neck behind, tapering to a short blunt muzzle. *Scales:* usually 17 rows of scales across middle of back; ventral plates, 132 to 138; subcaudal, 25 to 27. Tail very short, ending in a conical point. *Plates:* rostral plate twice as wide as long, semielliptical; anterior frontals small; posterior frontals moderate, rectangular behind; vertex plate hexagonal, about one-fourth longer than wide, anterior end very obtuse, posterior end obtuse but nearly rectangular; occipitals elongate, moderate, one-fourth longer than wide; superciliary moderate; two posterior ocular plates smaller than the one anterior ocular; six upper labials, 2nd and 3rd touching the anterior ocular; nasal plate long. Anal plate sometimes divided, usually undivided, large. *Color:* pale umber-brown, whitish below, edges of scales slightly lighter, subjacent skin black; the whole crown of the head with a large black patch, lowest on the sides at the back, but not so low as the bend of the angle of mouth or labials, rising towards the eye, leaving the post-oculars white, but touching the eye above from the superciliary being black, and these with the vertex plate form its anterior boundary, leaving all the rest of the anterior part of the head white except a narrow separate black band extending from one nostril to the other across the middle of the anterior frontals and middle of rostral plate. *Teeth:* there are usually four small solid teeth behind the fang and about ten in each of the two palate rows.

To show the small variation of the number of scales of back and the abdominal and subcaudal plates, I subjoin particulars of eight specimens in the National Museum collection:—

Specimens.	Number of Rows of Scales on Back.		Plates.		Total.	
	Middle.	Base of Tail.	Ventral.	Subcaudal.	Length.	Tail.
					in.	in.
1. Boroondara ...	17	15	137	27	11½	1¼
2. „ ...	18	15	138	26	12¼	1½
3. „ ...	18	15	138	25	...	...
4. Prahran... ...	18	15	137	25	11½	1¼
5. South Brighton ...	18	15	136	27	12¾	1⅝
6. „ ...	17	16	132	27	10½	1¼
7. Caulfield ...	17	15	136	25	...	...
8. Mount Martha ...	17	14	137	25	12¾	2

This little snake seems very local in its distribution ; it often excites alarm from being taken for the young of the Brown Snake, but it rarely reaches a foot in length, and is no more injurious than the sting of a bee, although its little poison fang and gland are on the usual plan of construction of the large dangerous species. It feeds on the small young of frogs and lizards.

Common at Brighton beach, being often dug out of the light sandy soil of gardens from a depth of several inches, and occasionally at Caulfield and Boroondara.

This species has not been figured before.

EXPLANATION OF FIGURES.

PLATE 11.—Fig. 1, ordinary specimen, natural size. Fig 1*a*, side view of head, magnified. Fig. 1*b*, under side of head, enlarged. Fig. 1*c*, upper side of head, enlarged, to show shape of plates and disposition of the black marking. Fig. 1*d*, palate, enlarged, to show teeth.

PLATE 11, FIG. 2.

HOPLOCEPHALUS CORONOIDES (GÜNTH.).

THE WHITE-LIPPED SNAKE.

DESCRIPTION.—Head very narrow, tapering from nape of neck to semi-elliptically rounded muzzle. *Scales:* usually 15 rows of scales across middle of back; ventral plates, 138 to 146; subcaudal plates, 43 to 51. *Plates:* vertex plate parallel-sided, hexagonal, about three times longer than wide, anterior and posterior ends alike in some specimens, but the anterior angle more obtuse in others ; rostral plate large, with an obtuse upper angle; superciliary plates, anterior ocular plates, and occipital plates long. *Color:* above usually plain brown or with a tinge of olive ; under side usually yellowish near the throat and salmon color from middle to tip of tail, the yellowish plates freckled with red, and the more posterior ventral plates freckled with grey. Lower labial and throat plates minutely freckled with black. A white streak extends from rostral along upper lip for about an inch, or sometimes nearly two, along side of neck ; a strong black upper edge separates this white band from the color of the upper surface, and an imperfect lower edging in parts of some specimens.

REFERENCE.—Günther Cat. Col. Snakes, p. 215.

In some specimens the under side is darker from a greater extent of the grey speckling. In spirit the upper surface becomes paler and more olive, and the under surface more of a dark slate color. The distinct white band along the upper lip and side of neck with

its black upper margin easily distinguishes this beautiful little snake from all others. It has been supposed hitherto to be peculiar to Tasmania, but it certainly (like the *H. superbus*, also supposed not to occur on the mainland) is a not uncommon species about Melbourne.

I subjoin particulars of four specimens to show the small range of variations in the scales and plates. This species is too small to produce any serious injury by its bite.

Specimens.	No. of Rows of Scales on Back.		Plates.		Total.		
	Middle.	Base of Tail.	Ventral	Sub-caudal.	Length.	Tail.	Gape.
					in.	in.	lines.
1. Upper Yarra	15	14	139	47	13	$2\frac{1}{2}$	$4\frac{1}{2}$
2. Bullarook Forest ...	16	14	138	51	$8\frac{1}{2}$	$1\frac{1}{2}$	4
3. Yarra-bank	15	14	139	46	$14\frac{1}{2}$	$2\frac{1}{2}$	6
4. Melbourne	15	14	146	43	$13\frac{1}{2}$	$2\frac{1}{2}$	6

The figured specimen is that from Yarra-bank, while the one from Bullarook Forest was remarkable for a more general rusty reddish coloring.

The head only has been figured of this species before.

Explanation of Figures.

Plate 11.—Fig. 2, ordinary specimen, natural size. Fig. 2*a*, side view of head, twice the natural size, to show the white band from nostril along the labial plates. Fig. 2*b*, under side of head and neck, twice the natural size, to show the form and coloring of the plates. Fig. 2*c*, upper view of head, twice the natural size, to show the forms of the head plates. Fig. 2*d*, view of palate, twice the natural size (in addition to the two rows on palate, there should be shown three or four small solid teeth behind the poison fang; they have disappeared in the lithographing). Fig. 2*e*, under side of abdominal and subcaudal plates, twice the natural size. Fig. 2*f*, upper side of end of tail, enlarged. Fig. 2*g*, eye, enlarged. Fig. 2*h*, some scales of back, enlarged.

Frederick McCoy.

Ludwig Becker del. & lith.

Prof. M. Coy, direx.

Hamel & Co. imp.

PLATE 12.

ACANTHOPHIS ANTARCTICA (SHAW SP.).

THE DEATH ADDER.

[Genus ACANTHOPHIS (Daud.). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Viperidæ ?)

Gen. Char.—Head large, broad, flat, wider than the neck behind, with very prominent superciliary ridges over the eyes. Neck narrow; body short, thick; tail short, with a trigonal section at base, but becoming very slender, and compressed towards the posterior end, with a recurved thorn-like spine, directed obliquely upwards at the extremity. Nostril large, between two rostral plates; no loreal plate; one large anterior longitudinally-grooved ocular plate, and two posterior ocular plates; two small subocular plates below the eye and over the 3rd and 4th labials. Rostral and two anterior frontals moderate, anterior ocular forming part of upper surface; vertex plate hexagonal or subpentagonal, one-third or one-fourth longer than wide; labials large, seven or eight below, six above, with a large temporal plate between the two hinder (5th and 6th); subcaudal plates in one row till near the narrow end. Scales of back keeled, most distinctly so in the anterior part, the keel becoming obsolete towards the hinder end. Eye small, pupil elliptical, erect. *Teeth*:—Fangs very large, perforated, fixed, 2 or 3 small teeth close behind each; no other teeth in upper jaw; two long rows of teeth on the palate bones; solid teeth of lower jaw small. Confined to Australasia.]

DESCRIPTION.—Body short, thick, rounded. *Scales:* plates on hinder part of head irregularly indented, grooved, and ridged, like large imbricating scales; scales on neck and anterior part of back strongly keeled, on hinder part of body larger, rounder, and thinner than in front. *Color:* dull greyish-brown, with about 40 darker brown transverse bands; tip of tail dull orange-yellow; ventral and subcaudal plates paler and blotched with blackish; labial and chin shields beautifully marked with blackish-brown marks, leaving the edges cream colored, the upper labials often minutely dotted with black and pink, the lower labials with the middle portion occupied by a dark blotch, approximately following the outline, but leaving a broad cream-color margin. One or two of the lateral rows of scales usually cream-color, and with a black blotch in the middle of the base; the small scales of the throat have each a small dark spot in the middle.

Specimens.	Scales of Back.		Plates.		Length.	
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.	Tail.
					ft. in.	in.
1	21	17	119	$24\frac{19}{19}$	2 $8\frac{1}{2}$	4
2	21	17	119	$24\frac{13}{13}$	1 $9\frac{1}{2}$	$3\frac{3}{4}$

Specimens of about 2 feet long are about 2 inches in diameter.

REFERENCE.—Wagler. Syst. 172. *Boa antarctica*, Shaw. Misc., t. 35. *Vipera acanthophis*, Schlegel. P. S., t. 21, f. 21, 23. *A. cerastinus* Lacep. An. Mus., v. 4, 10. *A. Browni* Leach. Zool. Misc., v. 1, t. 35.

This is the only Australian snake approaching the true viperine venomous snakes in having the fangs perforated and not grooved; they are, however, not so movable, but permanently erect, as in the *Elapidæ:* the whole of the characters of the singular genus *Acanthophis* (of which the present species is the only one known) incline to classing it in the family *Viperidæ* rather than with Colubrine snakes, although it is intermediate between the two groups in many respects. The popular name seems to be indifferently Death Adder or Deaf Adder. The harmless horny spine at the end of the tail is its most dangerous weapon, in the popular belief. It is generally supposed to be the most deadly of all the Australian snakes. A large dog bitten by a captive Death Adder in one of Dr. Halford's experiments was dead in 18 minutes.

When irritated it flattens the thick part of the body very greatly, and has a peculiar action of snapping to one side and the other alternately with great quickness when about to strike.

Not found in the southern parts of Victoria, but common in the hot tracts near the Murray.

Explanation of Figures.

Plate 12.—Fig. 1, view of ordinary specimen one-fourth the natural size. Fig. 1*a*, head viewed from above, natural size (the longitudinal keel-like ridges and sulci on the plates and scales not sufficiently distinct). Fig 1*b*, side view of head, natural size (the longitudinal groove in the anterior ocular is too definite or too much like a suture dividing two plates). Fig. 1*c*, head viewed from below, showing the chin and throat plates. Fig. 1*d*, front view of snout. Fig. 1*e*, under side of tail, natural size, showing the two rows of small scales at the compressed narrow termination beyond the single row of subcaudal plates. Fig. 1*f*, form of section of tail at base. Fig. 1*g*, side view of compressed slender portion of tail, with terminal spine. Fig. 1*h*, form of compressed section of posterior part of tail. Fig. 1*i*, keeled scales of back of neck.

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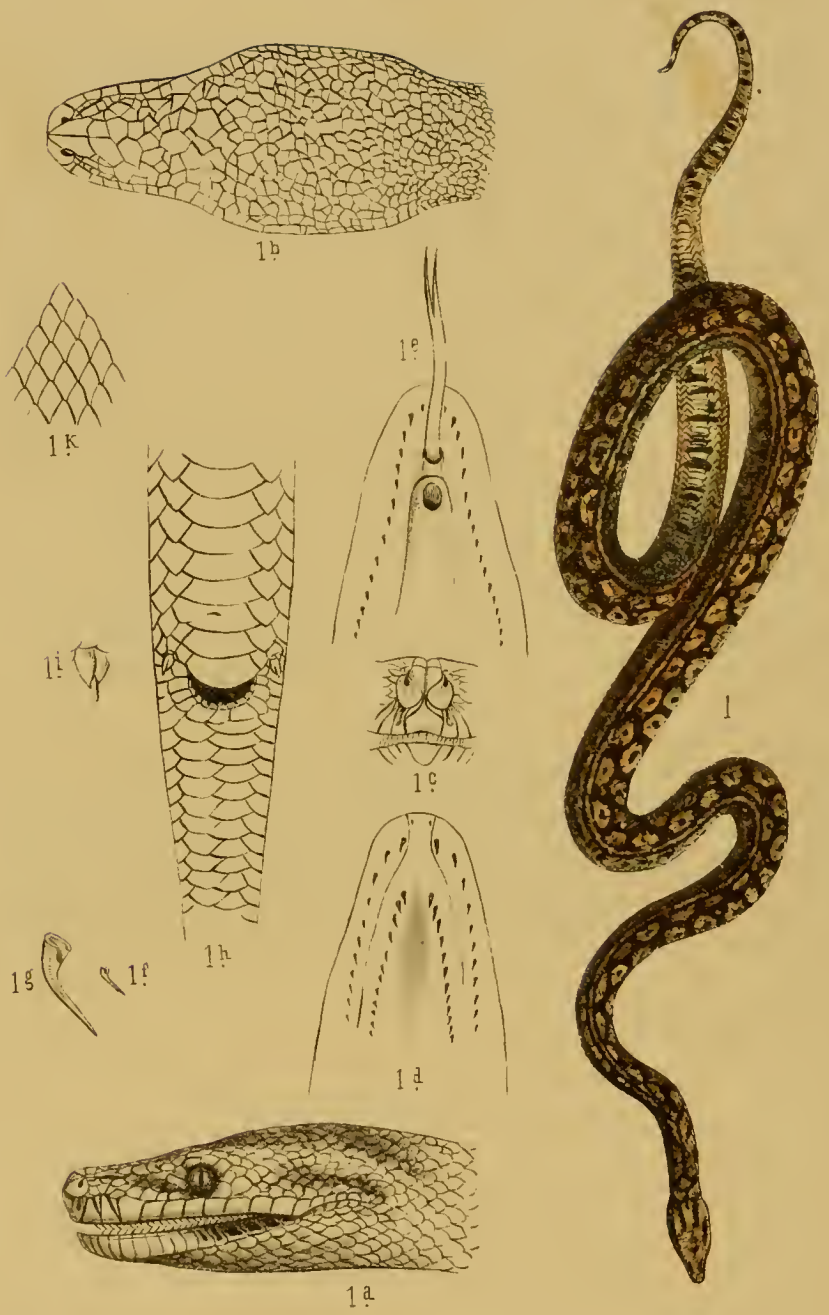

1b
1k
1e
1i
1h
1c
1
1g
1f
1d
1a

PLATE 13.

MORELIA VARIEGATA (GRAY).

THE CARPET SNAKE.

[Genus MORELIA (Gray). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Pythonidæ.)

Gen. Char.—Head moderate, ovate, flat above, broadly rounded behind; muzzle truncated. Neck narrow. Body long, moderately thick. Tail very short, prehensile, spirally inrolled, and with a pair of rudimentary legs, like short conical spurs, one on each side of its base below. Plates on top of head very small, numerous, irregular, scale-like; three frontal plates on each side; vertex plate very small, polygonal; rostral pentagonal, with a groove-like pit on each side of the upper margins; nostril in one plate, slightly grooved below; three front upper labials, and seven or eight hinder lower labial plates, with a deep pit in each. Eyes surrounded by ten small plates forming three-fourths of a circle, touching the sixth and seventh labials below. Pupil elliptical, erect. Scales of back small, smooth; abdominal plates narrow; subcaudals in two rows. Confined to Australia.]

DESCRIPTION.—*Color:* ground color, nearly uniform pale-brown having a tinge of greenish grey, with an irregular darker carpet-like pattern, usually of a long narrow dark streak surmounted by one of the light ground color of the same width, forming a double band along each side from head to near base of tail. The back is marked out into three or four rows of irregular lozenge-shaped patches of the pale ground color, usually with a blackish-brown blotch in the middle and margined by a broad blackish-brown outline. The upper part of the head is of the pale ground color, with one longitudinal dark streak from the nostril through the eye to the lateral angle of the head, where it usually joins a broad V-shaped round mark diverging from the vertex or first median plate on each side to near the lateral posterior angle of the head. From this V-shaped mark a short branch extends to near the middle of the eye. Between the posterior diverging ends of the V-shaped mark is a very constant broad rhombic dark-brown mark, extended posteriorly along the middle of the nape of the neck, and having a light patch in the middle of its broadest part. Belly pale-yellowish. The abdominal and subcaudal plates irregularly marked with blackish-brown blotches. Under part of head and neck pale without spots. *Teeth:* all the teeth are solid, of moderate size, and curved backwards; 2 on intermaxillaries in front of mouth, 11 on each side of upper jaw, and 12 on each palate bone, of which the 3 anterior are largest, the 1st one-sixth of an inch long, the hinder ones only one-sixteenth of an inch long; 15 to 17 in lower jaw, the 1st smallest, the 2nd one-tenth of an inch long, the others decreasing backwards.

Specimens.	Scales of Back.		Plates.		Length.		
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.		Tail.
					ft.	in.	in.
1. From Echuca	44	20	275	74–74	5	9	8
2. From Banks of Murray ...	44	20	274	75–75	5	0	7
3. From Swan Hill (young)	42	19	272	73–73	2	4	3¾
4. From Banks of Murray ...	43	20	280	76–76	6	6	11

REFERENCE.—Gray, Zool. Misc. 43, 54.

This is by far the largest snake in Victoria, but, like all the family *Pythonidæ*, or Rock Snakes, is perfectly harmless; all the teeth being small and solid, without groove or canal, and no poison gland being developed. Seven or eight feet is the largest size usually found, but individuals of ten feet long have been seen. The pattern of the coloring is very variable, but has some resemblance to some of the commoner sorts of Kidderminster carpets, as suggested by the popular name of Carpet Snake applied to it for many years in Victoria and New South Wales. The name Carpet Snake is, unfortunately, applied to the poisonous Tiger Snake in Tasmania, producing some confusion which the publication of recognizable figures of the two will obviate in future.

The Carpet Snake feeds on small quadrupeds, and poultry and other birds of similar size, which it crushes to death by winding round them before swallowing; catching them at night. The Carpet Snake, like the American Boa, can hang by the short prehensile tail coiled round a branch, with the two little leg-like spurs acting in opposition to effect a grasp or firm hold.

Not found in the cooler southern parts of the colony, but becoming common towards the northern Murray boundary.

Explanation of Figures.

Plate 13.—Fig. 1, specimen, one-fifth the natural size. Fig. 1*a*, head, side view, natural size. Fig. 1*b*, top of head, natural size. Fig. 1*c*, front view of snout, natural size. Fig. 1*d*, inner view of mouth, showing rows of teeth on the jaws and palate. Fig. 1*e*, inner view of lower jaw, showing the tongue with its sheath and the teeth on lower jaw. Figs. 1*f* and 1*g*, first palatine tooth, natural size, and magnified. Fig. 1*h*, base of tail, showing small abdominal spurs. Fig. 1*i*, spur, magnified. Fig. 1*k*, scales, natural size.

Frederick McCoy.

Pl. --

A Bartholomew. del. & lith. Prof. M.Coy, direx.t De Gruchy & Leigh, imp.

PLATE 14.

LATES COLONORUM (GÜNTH.).

THE GIPPSLAND PERCH.

[Genus LATES (Cuv.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Percidæ.)

Gen. Char.—Ovate, moderately compressed; scales moderate; opereulum with strong posterior spines; preoperculum serrated with strong teeth on the angle and lower edge; preorbitals strongly serrated; all the teeth small, villiform on the jaws, palate, and vomer; tongue smooth; anterior dorsal with seven or eight spines; anal fin with three spines; no pseudobranchiæ; six or seven branchiostegal rays. Fresh and brackish waters of Africa, India, and Australia.]

DESCRIPTION.—*Rays:* branchiostegals 6; first dorsal with eight strong spines, first about half the length of the second, which is little more than half the length of the third, which is the longest, the eighth little longer than the second; second dorsal fin with the first ray a strong spine, one-fourth longer than the last ray of the anterior dorsal, followed by 9 or 10 branched rays, the first longest and about two-fifths longer than the spinous ray; ventral fin with 1 strong spine and 5 branched rays, the first one two-fifths longer than the spine; anal fin with 3 strong spines and 7, 8, or 9 branched rays; pectoral fin 12, 13, or 14; caudal fin 17 or 18, with 4 short rays above and 4 short rays below. *Scales:* tubular along lateral line, 54, beyond without tubes, to base of tail, 6; in front of dorsal, above lateral line 8 or 9, below lateral line 19 to 21. *Form:* ovate, compressed, dorsal profile more convex than the ventral one, curving rapidly from greatest depth in front of dorsal fin to behind eye, thence concave to over front of orbit, then convex to snout; length of head three and three-fourths to three and one-third the length from snout to base of caudal fin; greatest depth from three to three and one-fifth in length to middle edge of caudal; diameter of eye nearly equal to length of snout, or about one-fourth of length of head; lower jaw longer than the upper. Caudal fin only slightly emarginate; preoperculum naked, with the posterior edge finely serrated, the angle obtusely rounded, it and the lower edge with large irregular unequal triangular spines directed downwards and forwards; operculum with a strong triangular sharp-pointed spine, with a shorter blunt one over it near the origin of the lateral line, and some smaller irregular ones between them; preocular, suboperculum, and interoperculum finely serrated. *Teeth:* very small, villiform, a band about 130 long and 25 rows broad in front, tapering to posterior end on each upper jaw; a much smaller band on each palate bone, about 109 in the length, 15 rows across anterior, and tapering to eight across the posterior end; patch on vomer subtrigonal or semilunar; band on lower jaw, about 135 teeth in the length and 14 across the anterior end. *Color:* dark greenish-olive on back, grey on sides, and white on belly; middle of the dorsal scales bright-silvery; front of head and mouth purplish; cheeks with green and red reflections; pectoral and first dorsal very pale, slightly clouded with grey; the other fins darker brownish-grey; iris bright yellow, with orange clouds.

REFERENCE.—Günther, Ann. and Mag. Nat. Hist., Feb. 1863, p. 114.

This fish occurs in great abundance in the Gippsland lakes opening into the sea, and is brought to the markets at Melbourne

in large quantities in the cold months ; it occurs also at Sandridge and at the mouth of the Saltwater River. The flesh is moderately good for the table.

The previously described species of *Lates* inhabit the Nile and the mouths of some of the large Indian rivers.

The following are the detailed measurements of a large example :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	20	0
„ of caudal	3	9
„ from snout to anterior edge of orbit	1	2
„ of eye	1	1
„ of head to end of operculum	4	9
„ from snout to anus (measured along ventral edge) ...	12	0
„ from snout to base of pectoral	4	9
„ from snout to origin of first dorsal	6	6
„ of pectoral	2	9
„ of first dorsal	4	0
„ of second dorsal	3	0
„ of anal	2	1
„ of ventral	2	10
„ from snout to base of ventral	6	3
Greatest height of anal	2	5
Width between eyes	0	10
Depth of body in front of dorsal	6	6
Thickness of body in front of dorsal	3	3
Height of first dorsal	1	7
Height of second dorsal	2	4

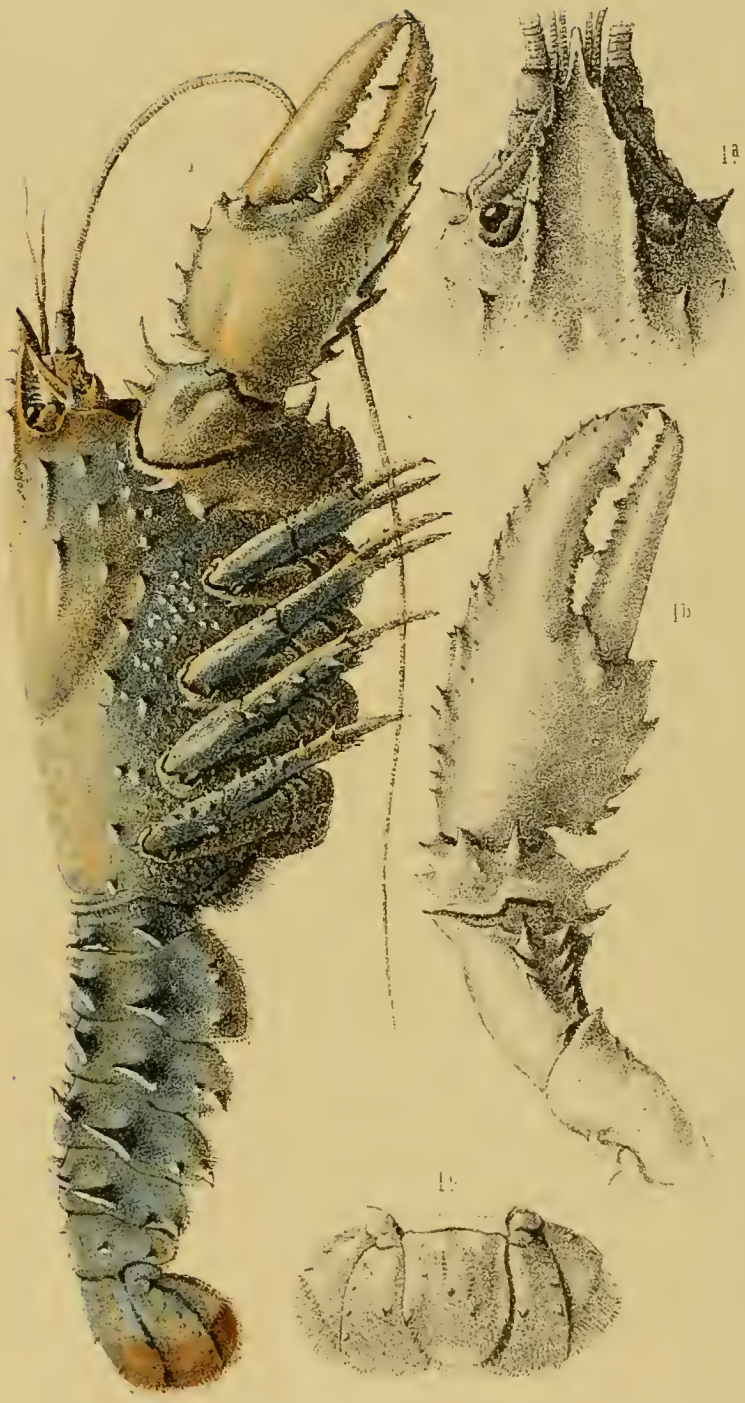
I have seen some specimens a little longer in proportion to the depth, probably constituting the *L. antarcticus* of Count Castelnau, and in one of them the teeth of the lower edge of the preoperculum are partially directed backwards as he describes, but this seems in my specimen to be an irregular growth from injury.

This fish has not been figured before.

Explanation of Figures.

Plate 14.—Fig. 1, seven-twelfths the natural size, with the colors of the living fish. Fig. 1*a*, scale from lateral line, magnified two diameters. Fig. 1*b*, scale from above lateral line, twice the natural size. Fig. 1*c*, inner view of mouth, three-fourths of natural size, showing the villiform teeth of the jaws, vomer, and palate bones. Fig. 1*d*, inner view of lower jaw, showing tongue and the villiform row of teeth on the jaws. Fig. 1*e*, form of section in front of dorsal.

Frederick McCoy.



Ludwig Becker. del. & lith. Prof. M. Coy. direx. Hamel & Cie imp.

PLATE 15.

ASTACOIDES SERRATUS (SHAW SP.).

THE MURRAY LOBSTER.

[Genus ASTACOIDES (Guér). (Sub-kingd. Articulata. Class Crustacea. Order Macrura. Fam. Astacidæ.)

Gen. Char.—General form and characters of *Astacus*, but with the first segment of the abdomen destitute of appendices. Abdominal feet membranous, with a row of small calcareous plates on each margin. Outer pair of tail fins jointed, with the distal portion thinner and less calcareous than the proximal one. Inner lobes not distinctly jointed, and calcareous to the end. Rivers of Madagascar and Australia.]

DESCRIPTION.—Beak elongate, acutely pointed at the apex, hollow above, with three or four strong teeth on the lateral bounding ridge of each side, usually a little longer than the base of the outer antennæ. Carapace with several large scattered spines on the sides in front of the nuchal furrow, which is very deeply impressed. One or sometimes two rows of large conical spines border the posterior side of the nuchal furrow, and extend along the division between the lateral vertical portion of the carapace and the horizontal dorsal portion. Whole of the vertical sides behind the nuchal furrow, or branchial regions, covered with small round prominent irregular tubercles about their own diameter apart; hepatic region or sides of the carapace in front of nuchal furrow set with numerous scattered conical spines, the upper ones larger. Segments of the abdomen having a row of very large conical spines on each side of the middle, the points usually directed slightly forwards; outside of this a second row of still larger ones, and, nearer the outer end, a third row, slightly more slender, not occurring on the first segment or the last, but two of which are usually found on the dilated margin of the second segment. The middle segment of the tail fin is sometimes smooth, but sometimes has 3 or 4 small conical spines and a variable number of smaller and more numerous pointed tubercles. Anterior feet or claws nearly equal: the outer edge of the hand has a row of 13 or 14 large compressed spines, with a second row a little beneath in the middle portion; the inner edge of the hand has usually 5 smaller spines, and there is a blunt conical one on the upper aspect, about a third of the width from the inner edge, at junction with carpus; outer edge of last joint or movable finger smooth, rounded. Carpus with 3 sharp conical spines on the outer edge and 3 much stronger on the inner edge, of which the anterior one is much the largest, and the anterior edge has 2 strong conical spines on the lower aspect. The next joint of the leg has 2 rows of large conical spines on the lower edge, and from 4 to 8 irregularly disposed on the upper edge. Four hinder pairs of legs with very irregular small spines. Anterior median triangular process of epistome about as long as wide. The outer antennæ are inserted below the inner ones. *Color:* the anterior legs, the middle of the back, and the apices of the spines and tubercles rich creamy white or ivory color; the ground color of the other legs, sides of carapace, and the abdomen pale prussian blue of varying intensity in different individuals, or sometimes mottled with dull olive-green. The semi-corneous flexible edges of tail fin brownish. Length of large specimen from snout to tip of tail, 12 inches 6 lines; diameter of carapace, 3 inches; length of carpus, 1 inch 7 lines; length of hand, 4 inches 3 lines; width of hand, 2 inches 3 lines.

REFERENCE.—*Cancer serratus*, Shaw. Zool. N. Hol. t. 8.—*Potamobius id.* White, P. Zool. S. 1850, p. 95.—*Astacoides spinifer*, Heller, Reise der Novara Crustaceen. Zoologisher Theil. Band. 11. Abtheil. 3, p. 102, t. 9.—*Astacus armatus* Von Martens, Ann. and Mag. Nat. Hist. 1860, p. 359.

M. Guérin-Méneville in the Revue Zoologique for 1840, p. 109, established the genus *Astacoides* for the large freshwater Crayfish of the Madagascar rivers, mainly distinguishing it from *Astacus* by the supposed absence of the small basal scale of the outer antennæ, which however is distinctly present, as noted by Professor Dana in the "United States Exploring Expedition:" but Erichson, in the Archiv für Naturgeschichte for 1846, p. 86, in his "Uebersicht der Arten der Gattung Astacus" re-defines the genus, noting that in the males there are no appendages to the first abdominal ring, and that those of the second ring are similar to those of the succeeding rings, this being really the most important character of the genus.

This gigantic species is now sent to the Melbourne market in considerable quantity from the Murray by railway for the table instead of lobsters, and is by far the most delicious of the few Victorian crustacea good for food.

All the spines vary in size and number, not only in different individuals, but on the two sides of the same one. The blue color is very much stronger in some individuals than in others, and I notice (Bibl. Univ. 15 Mars, 1870) that some of the reddish Crayfish in the rivers of Switzerland are said by local observers to be blue when recently moulted. Some specimens are olive-green where the blue appears in others.

I can have no doubt that the *A. spinifer* (Heller) described by him in the treatise on Crustacea in the "Voyage of the Novara," is identical with Shaw's species, although the spines on the middle lobe of the tail are more numerous than I have seen; and it is clear that Von Martens' *A. armatus* is also a synonym.

Very common in the River Murray, where it is caught by lowering a piece of bagging, with cords and floats to the four corners, with some flesh in the middle; this being pulled up every now and then shows three or four of the "Lobsters" feeding; a bit of meat at the end of a string suffices to catch them.

EXPLANATION OF FIGURES.

PLATE 15.—Fig. 1, side view of specimen, rather bluer than usual, half the natural size. Fig. 1*a*, rostrum and base of antennæ natural size of small specimen. Fig. 1*b*, anterior leg, viewed from inner side of small specimen, natural size. Fig. 1*c*, tail fin, half the natural size.

FREDERICK McCOY.

1a
1b
1c
1d
p
q
q
r

PLATES 16 AND 17.

ARRIPIS TRUTTACEUS (CUV. AND VAL. SP.).

THE SALMON ARRIPIS.

[Genus ARRIPIS (Jenyns). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Percidæ.)

Gen. Char.—Form moderately elongate, fusiform. Branchiostegal rays 7. All the teeth villiform; numerous rows of teeth on the palatine bones and on the vomer. Tongue smooth. One dorsal fin with nine slender spines and several branched rays. Anal fin with three spines and several branched rays. Caudal fin deeply forked. Preoperculum denticulated. Scales very finely ciliated at posterior edge; fan of diverging ridges nearly or quite obsolete, replaced by fine close striæ parallel to the anterior truncated margin. Pyloric appendages numerous. Confined to Australia.]

DESCRIPTION.—*Form:* regular, elongate, fusiform; top of the head flat or slightly convex, and destitute of scales, the lateral boundaries formed by the lateral projecting ridges of the upper edges of the orbits. Diameter of orbit one-fourth of the length of the head in specimens of ordinary length of 12 inches, (a smaller proportion in larger specimens) and about its own length from tip of snout, but one-sixth less than distance between the superciliary ridges across top of head; depth one-ninth less than the length of the head: length of head $3\frac{3}{4}$ in the total length to middle margin of caudal fin. *Fin-rays:* ventral, 1 spinous and 5 or 6 branched; pectoral, usually 16; anal, 3 spinous and usually 10 branched, last two from one base; dorsal, 9 spinous and usually 16 branched; caudal, 17, with 4 to 5 short ones above and 4 to 7 short ones below. *Scales:* along lateral line, with tubes, about 50; without tubes, on tail, about 3 or 4: vertical rows of scales, 6 above lateral line; 12 below lateral line. *Color:* back and sides above lateral line blackish-olive (with, in some lights, a bluish-black cast), clouded with large irregular ill-defined darker spots, indistinctly arranged in vertical groups, in individuals of 11 inches or more in length, but forming about 28 alternately longer and shorter narrow distinct vertical bands in specimens of 8 inches or less, gradually becoming paler to the level of lower edge of pectoral, and destitute of the darker mottling, and with a pale greenish-bronze metallic reflection, becoming silvery or pearly-white, with slight pink or blue reflections, on lower part of throat, abdomen, and tail; operculum and preoperculum reflecting and colored like side of body; interoperculum and suboperculum white and silvery, like abdomen; top of head, snout, and both lips, in front of eye, and portion of skin outside the iris, sooty-black; hinder part of dentary bone white; iris greenish-gold, with a blackish arched mark above and below; along, or slightly under lateral line, a row of about 12 large round spots of the color of lacquered brass, about their own diameter apart, and of about equal size from operculum to tail, and below this 3 or 4 similar but shorter rows. Pectoral fin rich indian-yellow, with a blackish base, tip, and edge. Ventral fins almost colorless, pinkish at base, yellowish for distal two-thirds. Dorsal membrane pale blackish, with yellowish rays, the branched tips of those of the second dorsal forming a dark border to the fin, the membrane minutely dotted with black under the lens. Anal fin colorless, like ventral, but the membrane with microscopic black dots, and the branching ends of the rays blackish. Caudal fin very dark-olive, with the tips and posterior edge blackish. Pancreatic cæca of pylorus of very numerous (170) short slender branches, chiefly simple.

The following are the dimensions of an average specimen such as may commonly be found in the market with the adult characters:—

Measurements.	Ins.	lines.
Length from tip of snout to distal end of caudal fin	24	0
„ from tip of snout to middle of posterior edge of dorsal fin ...	17	0
„ from tip of snout to end of body	20	6
„ of caudal	4	3
„ from snout to edge of preoperculum	4	3
„ from snout to base of pectoral	6	2
„ from snout to anterior edge of orbit	1	5
Antero-posterior diameter of orbit	1	4
Length of head from snout to edge of operculum	5	7
„ from snout to anus	14	0
„ of pectoral	2	7
„ of anal	3	0
„ of ventral fin	2	5
Breadth between eyes	1	10
Depth of body in front of first dorsal	6	0
Greatest thickness of same below lateral line	4	2
Greatest height of dorsal at third spine	2	2
Height of last spine	0	11
Height of next branched ray	1	4

Young specimens up to 3 or 4 inches long have the sides of the head behind the eye and lower half of the body whiter and more silvery than the larger ones, with 2 or 3 longitudinal rows of round brassy spots, the length of the uncovered portion of two or three scales in diameter; the back and upper part of sides above the lateral line of a brownish-grey olive, lighter than in older individuals, with from 15 to 17 distinct transverse darker bands, only two or three of which show any indication of breaking up into blotches or spots, as in the older individuals. Pectoral bright-yellow, with black base; caudal yellowish-olive; snout brownish. The depth of the body varies considerably at this size (from $3\frac{1}{3}$ to 4 times in length of body, without fin); the length of head in each case being $3\frac{1}{2}$ times in length without caudal fin. The thickness also in each of these cases remaining constant for this size at one-eighth of the length without caudal, although, of course, in the one case it was half the depth, and considerably less in the other. Iris yellow. The denticulation of the preoperculum does not exist in this young stage on the posterior edge (thus agreeing with Cuvier's *Centropristes truttaceus*), although stronger, and terminating more distinct and direct ridging on the lower margin, than in the adult; and at this size the diameter of the orbits equals the space between the eyes, as in Sir J. Richardson's *C. salar*, so that they grow proportionately smaller with age.

To show the constancy of the fin-rays and scales in this species, I subjoin particulars of seven specimens in the National Museum of very various sizes:—

Specimens.	Dorsals.	Anal.	Caudal.	Pectoral.	Ventral.	Scales.			Length from Snout to tip of Caudal.	
						Along Lateral Line.	Above Lateral Line.	Below Lateral Line.		
									In.	lines.
1	9+16	3+10	19	16	1+5	54	7	17	13	0
2	9+18	3+ 9	20	16	1+5	49	7	18	10	6
3	9+16	3+10	21	16	1+5	55	7	17	19	0
4	9+16	3+10	20	16	1+5	53	7	17	15	9
5	9+16	3+10	20	15	1+5	52	6	18	8	3
6	9+17	3+10	20	16	1+5	56	7	16	24	0
7	9+15	3+10	20	16	1+5	53	6	16	5	0

REFERENCE.—*Centropristes truttaceus* (Cuv. and Val.), Hist. Nat. des Poiss., v. 3, p. 50, 1829. *Centropristes salar* (Richardson), Zool. Proc., 1838, Zool. Trans., v. 3, p. 78. *Centropristes Tasmanicus* (Hombr. and Jacq.), Voy. au Pole Sud Poiss., t. 4, f. 1. *(?) Perca trutta* (Cuv. and Val.), Hist. Nat. des Poiss., v. 4, p. 54.

The genus *Arripis* of Jenyns was named from the absence of the usual fan of diverging ridges on the basal portion of the scales in his typical species the *A. Georgianus* (or Ruffy of the colonial fishermen); but it is slightly indicated by a few longitudinal ridges in our fish which is referable to the same genus. The two spines on the operculum, likewise noted by Jenyns in his type, although well marked in it, are almost entirely obsolete in the present fish, so that I have omitted them also from the generic character. The Ruffy (*A. Georgianus*) differs from the present fish, when specimens of the same size are compared, by its much coarser serration of the scales of the body, giving rise to the popular name, as the difference in roughness may be felt by the finger; also by the two distinct spines on the hind edge of the operculum; and by the last spines of the dorsal not being so much shorter than the next ray of the branched portion: the coloring also is greyer, and otherwise different in the *A. Georgianus,* as I will point out when figuring that species.

The adult condition of this fish, which is attained at about 2 feet in length, is improperly called "Salmon" by the colonists of the Victorian coasts, and is of a nearly uniform pale-olive color, without spots, paler on the lower half of the body. When about a foot in length it is popularly called "Salmon trout" by the fishermen and in the markets, and then differs from the adult in its smaller size, proportionately larger eyes, dark cloudy spots on the back, and the conspicuous rows of large round brass-like spots on the sides. All these characters I have many years ago proved to be merely characteristics of the younger stages of growth.

The *Centropristes truttaceus* of Cuvier was mainly characterized by the posterior edge of the preoperculum not being denticulated. This I have also proved by the demonstration of the characters in several specimens to be a character of the very young of the same species, with which it should, as well probably as the *Perca trutta* of Cuvier, be united. The very young when examined alive have

the caudal fin yellow with a black margin. These colors, however, fade quickly in spirit or on dried skins ; so this coloring, noted by Cuvier on a drawing from life, of a fish of which he had never seen a specimen, gave rise to his species *Perca marginata*, which, as all the other characters also are those of young *Arripis truttaceus*, I have proposed should likewise be considered a synonym of the present species ; thus reducing five supposed species of Victorian fish to one.

Nearly all the cases of fish-poisoning in Victoria are referable to this species. Some persons are under the impression that the bad consequences are due to incipient decomposition ; but I am certain that this is not always the case, as I have known several instances in which the effects were strongly marked after eating perfectly fresh examples, caught only an hour or so before cooking. It is curious that it is only at certain times and to certain people that this fish is more or less poisonous, while certainly good for food under other circumstances not yet understood. I have known three out of five people made seriously ill from eating at breakfast newly caught fish from one basket, and the two others felt no inconvenience whatever. The symptoms are, generally a few hours after eating, an extraordinary redness or flush of the skin, particularly of the face, often followed by an irruption, which soon passes away, with great derangement of the digestive organs, severe headache, vomiting, &c. Some cases of death have been reported, but, generally, the bad symptoms pass away in a few hours or days.*

The flesh has often a dull pinkish tinge, which may be one of the reasons for the popular application of the names "salmon" and "salmon trout" to this fish, not resembling the true salmon in any important respect.

The curvature of the back is rather greater than that of the abdomen in most specimens, especially of the younger ages. The dorsal and anal fins can be lowered into a groove at their bases. The swimming bladder is large, and of a delicate membranous texture. The pyloric appendages, which are counted as 17 to 50 by Dr. Günther, I find to be as many as 160 in several specimens.

* Dr. Youl, the City Coroner for many years, informs me that although he has seen many of these cases of fish-poisoning, the deaths reported were found by the jury to be due to other causes.

One of the most abundant of the food-fishes of Victoria in all the warmer months of the year, disappearing in the cold weather. It is not usually seen at the best tables, but is sold in great quantities by hawkers round the suburbs of Melbourne. The younger ages are very conspicuous in the fish shops by their yellow pectorals.

Explanation of Figures.

Plate 16.—Fig. 1, figure showing form and coloring of the adult at the age popularly called "Salmon," half the natural size. Fig. 1*a*, form of section in front of first dorsal. Fig. 1*b*, form of section of tail. Fig. 1*c*, one of the scales, natural size, showing the very fine ciliation of the free edge and the straight basal edge with the fine striation parallel to it, characteristic of the genus, but showing also a few longitudinal ridges. Fig. 1*d*, mouth, showing the arrangement of the various patches of villiform teeth on the jaws; those on the palate bones being marked *b*, and those on the vomer marked *c*; the tongue is marked *a*.

Plate 17.—Fig. 1, specimen two-thirds of natural size, showing form and coloring at the age popularly called "salmon trout." Fig. 1*a*, head, natural size, to show the disposition of the scales and the radiation and crenulated edge of the preoperculum. Fig. 1*b*, form of section in front of dorsal. Fig. 1*c*, scale from lateral line, magnified. Fig. 1*d*, scale from below lateral line, magnified.

Fig. 2, younger specimen, natural size, showing the form and coloring at the young age when the tail is yellow with the black margin, as in the *Perca marginata* of Cuvier. Fig. 2*a*, section of head through the eyes, showing the larger proportion of these than in the adult. Fig. 2*b*, form of section in front of dorsal. Fig. 2*c*, section of tail.

Frederick McCoy.

1c
1b
1
1a

PLATE 18.

TRACHURUS TRACHURUS (LIN. SP.).

THE HORSE MACKEREL.

[Genus TRACHURUS (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Carangidæ.)

Gen. Char.—Body moderately slender, compressed, fusiform, covered with small scales, except on the lateral line, which is set from anterior to posterior end with a series of large elliptical plates three or four times higher than long, each with a spine directed backwards near the middle. First dorsal fin less than half the length of the second, of one small anterior spine directed forwards, and eight slender spinous rays; second dorsal extending nearly to base of tail, of one spinous and many branched rays; anal, as long as the second dorsal, of two very short thick spines, forming a small fin in front of the remaining portion, of which the first slender ray is spinous, the rest branched; pectoral pointed; caudal deeply forked. Teeth minute on jaw, vomer, and palate bones. Branchiostegal rays seven; pseudobranchiæ; swimming-bladder forked behind.]

DESCRIPTION.—*Fin rays:* 1st dorsal of 8 spines, the third longest; 2nd dorsal scarcely separated from the anterior; 1st ray a slender spine, nearly twice the length of the last ray of the 1st dorsal and $\frac{3}{5}$ the length of the first of the 32 branched rays; anal, 2 short anterior spines only $\frac{1}{3}$ of the length of the slender one in front of the series of 28 branched rays; pectoral fin pointed, reaching to 3rd ray of 2nd dorsal, of 21 rays; ventral fin of 1 spinous and 5 branched rays; caudal fin of 15 rays, with 5 short rays above and 5 below those extending to the angles of the fin. *Scales:* along lateral line, 84; above, 10; below it, 16. *Form:* greatest depth of body, in front of 1st dorsal, about five times in length to middle edge of caudal fin; thickness there rather more than half the depth; section at tail rhombic, slightly wider than deep; diameter of eye slightly less than length of snout; length of head equal to length of pectoral, and $\frac{1}{4}$ of total length to middle edge of caudal fin; lateral line at about $\frac{1}{5}$ of the depth from the dorsal edge until end of 1st dorsal, then bending down and continuing about the middle of the side to the caudal. *Color:* back and upper part of sides olive bronze-green, freckled with darker; top of snout, base of pectoral, and round blotch at posterior angle of operculum brownish-black; lower part of cheeks, sides, and belly greyish-white, with brilliant iridescent reflections of pink, gold, and emerald-green; caudal fin pale-olive, with darker margin, and speckled with blackish; the other fins pale-greyish, speckled with blackish; iris golden-yellow above, silvery below.

REFERENCE.—*Scomber trachurus* (Lin.), Syst. Nat., 1, p. 494; Bloch, t. 56. *Caranx trachurus* (Cuv. & Val.), Hist. Poiss., v. 9, t. 246.

The following are the detailed measurements :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	10	7
„ of caudal	1	8
„ from snout to anterior edge of orbit	0	9
, of eye	0	7
, of head to end of operculum	2	5
„ from snout tu anus (measured along ventral edge) ...	4	8
„ from snout to base of pectoral	2	6
„ from snout to origin of 1st dorsal	3	0
„ of pectural...	2	6
„ of 1st dorsal	1	5
„ of 2nd dorsal	3	7
„ of anal (including anterior spines)	3	5
„ of ventral	1	3
„ from snout to base of ventral	2	9
Width between eyes	0	7
Depth of body in front of dorsal	2	0
Thickness of body in front of dorsal	1	2
Height of 1st dorsal	1	3
Height of 2nd dorsal at highest anterior end	1	0

This is one of the few fishes of our coast identical with a European species. It is a very rare visitor. The specimen figured was caught in Hobson's Bay on the 3rd August.

EXPLANATION OF FIGURES.

PLATE 18.—Fig. 1, view, three-fourths the natural size, of the colors of the living fish Fig. 1*a*, spinous plate from lateral line, magnified 4 diameters. Fig. 1*b*, section in front of dorsal. Fig 1*c*, one of the scales above lateral line, magnified.

FREDERICK McCOY.

Pl. 19.

(Fishes.)

1a

1c

1

1b

Drawn by A. Bartholomew. Lith. F. McCoy, auct. F. Schaefer, imp.

PLATE 19.

LOTELLA CALLARIAS (GÜNTH.).

THE SMALL-SCALED ROCK COD.

[Genus LOTELLA (KAUP.). (Sub-kingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Gadidæ.)

Gen. Char.—Body moderately elongate, tapering from head. Caudal fin distinctly separated from the dorsal and anal. Two dorsal fins, the second much the larger. One anal fin, nearly equalling the second dorsal. Pectorals moderate, rounded. Ventral fin small, situated under the front of the pectoral with a flat base, with usually two long filamentous outer rays and a few shorter ones. Scales very small. Teeth forming a broad band of numerous rows in the upper jaw, with conspicuously larger ones in the outer row; no teeth on the vomer or palatine bones. Branchiostegal rays, usually seven. Chin with a barbel.]

DESCRIPTION.—*Rays:* branchiostegal, 7; anal, 58; dorsals, anterior 5, posterior 63; ventral, 7; pectoral, 22; caudal, 28. *Scales:* along lateral line, 244 tubular, and about 10 beyond to base of caudal rays not pierced; vertical scales, 33 above lateral line, from front of first dorsal, 77 below lateral line. *Color:* whole body and the scaly skin on base of dorsal, anal, pectoral, and caudal fins tawny-brown, becoming lighter towards the belly. Throat and lips pinkish flesh-color. The margin of the dorsal, ventral, and caudal fins purplish-black, below which the fins are purplish flesh-color, tinged with brown towards the base; the anterior base of each scale is lighter than the margin. *Teeth:* exceedingly minute, except the larger conical teeth of the outer row, which are irregular in size, shape, and distribution; about 7 or 8 on each side of upper jaw, and 10 or 12 on each side of lower jaw. *Fins:* ventral with a moderately narrow base, the two outer rays simple and extended into long filaments, the second longest nearly equalling the pectoral in length, and reaching more than halfway from its base to the vent; the other five rays branched, and forming with the membrane the triangular fin rather more than half the length of the longest filament. The shorter first filament equal to half the length from base of pectoral to vent, and a little exceeding the barbel of the chin in length.

REFERENCE.—Ann. and Mag. Nat. Hist. Feb. 1863, p. 116.

The following are the dimensions of an average specimen :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	22	0
„ of caudal	2	0
„ from snout to anterior edge of orbit	1	3
„ of orbit	0	9
„ of head to end of operculum	4	6
„ from snout to anus	8	0
„ from snout to base of pectoral	5	2
„ from snout to origin of first dorsal	5	3
„ of pectoral	2	10
„ of first dorsal	1	2
„ of second dorsal	12	4
„ of anal	10	6
„ of first ventral filament	1	9
„ of second ventral filament	2	7
„ of barbel	1	7
Width between eyes	1	0
Depth of body in front of dorsal	5	9
Thickness of body in front of dorsal	3	6
Height of first dorsal	1	7
Height of second dorsal at highest posterior end	1	6

This, like all the other species of *Lotella*, differs from the ordinary Rock Cod (*Pseudophysis*) in the comparatively large conical irregular outer row of teeth.

This fish is much rarer than the ordinary Rock Cod ; being caught however at the same time of the year, and in similar localities in Port Phillip Bay. It is easily distinguished, even without the characters of the mouth, by the more uniform brown color and very much smaller and more numerous scales. It is moderately good for the table, but not in much request.

This species has not been figured before.

EXPLANATION OF FIGURES.

PLATE 19.—Fig. 1, ordinary specimen, one-third the natural size. Fig. 1*a*, line representing the greatest thickness of the fish, to same scale. Fig. 1*b*, mouth, natural size, showing the rows of small and larger teeth. Fig. 1*c*, scales from below pectoral fin, natural size.

FREDERICK MCCOY.

Pl. 21

1a

1b

1c

1

Drawn by A Burchmore

Lith Melroy direct

F Schonteld lith

PLATE 20.

PSEUDOPHYSIS BARBATUS (GÜNTH.).

THE AUSTRALIAN ROCK COD.

[Genus PSEUDOPHYSIS (Günth.). (Sub-kingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Gadidæ.)

Gen. Char.—Body moderately elongate, tapering from head; scales small, cycloid, loose; two dorsal fins; one anal fin. Ventral fins long, narrow at base; teeth in a band of several rows of equal small size (outer ones not larger than the others); no teeth on vomer or palate bones. Chin with a barbel. Confined to Australasia.]

DESCRIPTION.—*Rays:* branchiostegal, 7; anal, 44 to 57; dorsals, anterior 9 to 11, posterior 48 to 57; ventral, 5 to 6; pectoral, 22 to 26; caudal, 26 to 30. *Scales:* along lateral line, 116 to 128, of which about only 104 are tubular; vertical scales, 15 to 18 above lateral line, 31 to 47 below lateral line, from first dorsal. *Color:* whole body pale brownish-olive, the centre or basal part of the scales, on lower part of the sides, lighter and their edges minutely freckled, fading into pinkish-white on the throat and belly; slightly darker, and with slight purplish tinge on back, top of head, snout and lips; but the operculum silvery. Ventral fins pinkish-white, like the throat. Pectoral fin pale-purplish, with a large purplish-black spot at the upper part of its base. Dorsals, caudal, and anal fins purplish at base, with a dull orange tinge higher up, and with a narrow blackish-purple border; the lower portion of each fin is covered nearly up to the margin by very small olive scales on a loose skin. *Teeth:* small, short, hooked, subequal, forming a broad band on each side in each jaw, about 4 or 5 rows in width in each patch, and about 78 above and 48 below in length; the lower teeth a little larger than the upper. A large double oval patch of pharyngeal teeth, as large as those of the jaws, on each side. *Fins:* ventral fin with rather narrow base, only the first two rays simple, prolonged into filaments, the second longest, the first about as long as the pectoral, and reaching less than half way from its base to the anus; the other three rays branched, and forming, with the membrane, the triangular fin, less than half the length of the filaments.

REFERENCE.—Ann. and Mag. Nat. Hist. Feb. 1863, p. 116.

The following are the dimensions of a rather large specimen :—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	17	6
„ of caudal	1	5
„ from snout to anterior edge of orbit	1	3½
„ of orbit	0	9
„ of head to end of operculum	3	8
„ from snout to anus (measured along ventral edge) ...	6	8
„ from snout to base of pectoral	4	3
„ from snout to origin of first dorsal	4	10
„ of pectoral	1	9
„ of first dorsal	1	6
„ of second dorsal	8	8
„ of anal	8	6
„ of second ventral filament	2	3
* „ of barbel	0	11
Width between eyes	1	3
Depth of body in front of dorsal	4	9
Thickness of body in front of dorsal	2	10
Height of first dorsal	1	3
Height of second dorsal at highest posterior end	1	3

* In females of about the same size the barbel is only about 5 lines long, and the longest ventral filament 1 inch 8 lines. In some specimens the barbel is only 3 lines long.

To show the singular variability of the fin rays in this species, I subjoin particulars of six specimens in the National Museum, all about the same size, and agreeing in other respects :—

Specimens.	Fin Rays.					Scales.		
	Dorsals.	Anals.	Caudal.	Pectoral.	Ventral.	Along Lateral Line.	Above Lateral Line.	Below Lateral Line.
Specimen drawn ...	9+57	56	30	26	5	124	18	47
Two stuffed	9+54	57	26	23	5	119	15	31
	10+52	54	28	22	5	116	15	36
Three in spirit	9+48	44	29	25	5	122	17	41
	10+51	47	27	24	6	124	16	40
	11+48	52	28	24	5	128	15	38

The species of *Pseudophysis* are distinguished from those of the very similar genus *Lotella* by the outer teeth being no larger than those of the inner rows.

This fish, not having been figured before, may "point a moral and adorn a tale" *apropos* of the utility of having our colonial fishes accurately figured and described for reference. I was called upon soon after arriving in the colony to assist at a grand dinner in the old Criterion Hotel of "merchants, bankers, and others," who had been brought together to taste this fish, to satisfy themselves it was a real Newfoundland cod, a bank of which had been discovered in Victorian waters by fishermen—practical men—who proposed to give the assembled gentlemen and their friends the opportunity of subscribing so many thousands for a fleet of boats, so many thousands for curing establishments on land, so much to the discoverers, &c., to form a cod-fishing company. The small size of the cooked fish and its inferior flavor was explained by the discoverers having been so ill provided that they could only catch a few very young ones. The statistics of the Newfoundland cod fisheries were quoted to show the great profit which would arise from this investment, and all went well, until one of the guests, who shall be nameless, earned great unpopularity by giving some reason for believing that the samples, 16 or 17 inches long, were not young, but adult ; and referring to the title of Sam Slick's new book at the time, "How many Fins has a Cod ?" showed that, as the real cod had three

dorsal fins and two anal ones, and that the Victorian fish in question had only two dorsals and one anal, they could not be even of the same genus, and that no arguments based on the identity with the true cod could be relied upon for the commercial speculation. The project collapsed ; and although none of the capitalists willing to invest in the matter then knew "how many fins had a cod," the figure now given will settle the identity of our fish for the future.

This species seems to vary more than usual in the number of the fin rays, some of our specimens having more and some less than in Dr. Günther's type. The very much smaller and more numerous scales readily distinguish it from the New Zealand *Pseudophysis breviusculus*.

The abdomen between the throat and anal fin is very prominent, owing to the unusually large size of the liver.

Caught commonly with a line all the colder months of the year in Port Philip Bay on rocky reefs in five or six fathoms water. It is sold in the markets commonly for the table, but the flesh is soft and not very good. The fishermen report the spawning time to be in April.

EXPLANATION OF FIGURES.

PLATE 20.—Fig. 1, view of ordinary specimen, three-eighths the natural size, of the colors of the living fish. Fig. 1*a*, form of section. Fig. 1*b*, rows of small equal teeth on the jaws and teeth on back of tongue. Fig. 1*c*, scales from below lateral line behind pectoral fin, natural size.

FREDERICK McCOY.

By Authority: JOHN FERRES, Government Printer.

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MARY D. ROGICK

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

VICTORIAN INDIGENOUS ANIMALS.

DECADE III.

BY

FREDERICK McCOY,

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M DCCC LXXIX.

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PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers

in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This third Decade gives figures and descriptions in the first plate of the largest species of Seal, the Sea-Leopard, occurring on our coasts.

The second plate represents another marine mammal, the yellow-sided Dolphin, or Bottle-nose of sailors, occasionally following shoals of fish into Hobson's Bay.

The third plate shows the characters of three species of dangerous, poisonous snakes, hitherto confounded under the name of "Brown Snake." One of these is the large deadly "Common Brown Snake;" of the other two, not before figured or described, one is distinguished by the much smaller scales, in more numerous rows, across the neck and back; while the third is marked by the great size of the rostral shield covering the anterior part of the head; all three being equally large and venomous.

The fourth plate represents the seventeen Victorian species of the beautiful genus *Catenicella*, which may almost be looked on as characteristic of the Australian seas, from the number of species and abundance of individuals of these exquisite objects for microscopic observation occurring in Australasian waters, and the fact that comparatively few are found elsewhere.

The fifth and sixth plates give illustrations of all the known Victorian species of *Membranipora*, another genus of the same order, *Polyzoa*, of minute, beautiful objects, really allied to the *Mollusca*, but often popularly called Lace-Corals, from their delicate tracery and a mistaken notion of their affinities. The *Polyzoa* abound in the fossil state in our Tertiary rocks, and the publication

of the species now living on our coasts is a necessary preliminary to the study by the geologist of the extinct ones in various strata. I am greatly indebted to one of the most distinguished investigators of these animals, my friend Dr. MacGillivray, of Sandhurst, for presenting specimens of all the native species of these two genera to the National Museum collection, and placing at my disposal the whole of his descriptive and critical notes for the purposes of this publication. The lithographic figures will, I hope, be found to be perfectly efficient for the distinction of the species; I have at least spared no trouble to make them so.

The seventh plate represents two interesting fishes not figured before, one a marine species commonly called Australian Rockling, and the other the most popular of the freshwater fishes of the Yarra and its tributaries, the Yarra Blackfish, a new species of the extraordinary genus *Gadopsis*, which seems to combine the characters of the two great systematic groups of Fishes, the *Acanthopterygii* and the *Malacopterygii*, or *Anacanthini*.

The eighth plate shows the characters of a Mackerel with a swim-bladder, occasionally appearing in Hobson's Bay, which I believe to be identical with the Southern or Spanish Mackerel of Europe.

The ninth plate represents a fresh-water Crayfish of the genus *Astacoides,* abounding in swamps and waterholes from Melbourne, on the south, to the Murray flats, on the north extremity of the colony. This is commonly called Yabber or Yabbie, and is highly praised as an article of food by some, and spoken of bitterly by others, from the mischief it does in boring through the banks of water-dams.

The tenth plate represents the largest-bodied of our Lepidopterous insects, the gigantic Wattle Goat-moth, the larva of which is very destructive to the Wattle or Acacia trees, so valuable for their tanner's bark, by boring great holes in the timber, on which they

feed ; these larvæ, three-quarters of an inch in diameter and five inches long, forming a succulent and most delicious *bonne bouche* for the natives.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

Frederick McCoy.

10th March 1879.

1
1a
1b
1c
1d
1e

PLATE 21.

STENORHYNCHUS LEPTONYX (DE BLAINV. SP.).

THE SEA-LEOPARD SEAL.

[Genus STENORHYNCHUS (F. CUV.). (Sub-kingd. Vertebrata. Class Mammalia. Order Pinnipedia. Fam. Phocidæ.)

Gen. Char.—Dental formula :—*i.*, $\frac{2-2}{2-2}$; *c.*, $\frac{1-1}{1-1}$; *m.*, $\frac{5-5}{5-5}$ = 32. Incisors conical; outer upper ones largest and resembling the canines. Molars compressed with the crown, divided into three long, narrow, conical lobes, the middle one largest; the anterior molar in each jaw with one root, the others double-rooted. Muzzle compressed, elongated, broad, simple, hairy. Whiskers small, wavy, tapering; no external ears; fore feet triangular; wrist very short; hind feet of two nearly equal lobes; three middle toes small; claws of anterior limbs small; of posterior ones obsolete. Skull elongate, orbits moderate; lower jaw strong, with an acute angle behind; fur close-set, short, of flat, tapering hairs; without under fur.]

DESCRIPTION.—Length of adult male about 10 feet. *Color:* above yellowish light ashy-grey, with numerous, irregular, large spots, or small irregular patches, of dull yellowish-white, and darker grey spots on the sides of the neck and body, with occasional, smaller, irregular, black spots, and a few smaller, whitish spots on the sides of the body; upper part of hind limbs dark-grey, irregularly marbled with lighter patches and spots, and dark-brown, large patches and streaks, darkest on the margins. Anterior limb, or pectoral, with the anterior margin marked with dark-brown patches; the posterior portion dark-grey. Iris blackish-brown. Throat, belly, and lower portion of sides dull yellowish-white with a few small blackish spots. Lips black.

MEASUREMENTS OF TWO SPECIMENS IN MUSEUM.

——	Large.	Small.
	ft. ins.	ft. ins.
Length from tip of snout to extremity of tail	9 7	6 3¼
„ from tip of snout to occiput	1 3	1 0
„ from tip of snout to front of pectoral	3 5	2 4
„ from tip of snout to eye	0 6¼	0 6
„ of pectoral	1 8	1 1½

REFERENCE.—*Phoca leptonyx* (de Blainville), Journ. Phys. xci., 288, 1820= *Stenorhynchus leptonyx* (F. Cuvier), Dict. Sc. Nat. xxxix., 549, t. 44.

This, the largest of the Seals frequenting our coast, is a most voracious devourer of fish and occasionally of marine birds. It is a good example of the group of genera termed "Earless Seals," from their having no external ear-conch visible. Unlike the Eared Seals, the hind limbs are directed backwards when at rest, nearly

in a line with the body, and closely approximated to the tail, with only a moderate, obliquely lateral, power of motion; so that, on the land, instead of raising the body clear of the ground and walking on the four legs like the eared seals, it can only progress painfully on the land by the action of the abdominal muscles and singularly flexible spine. Dr. Ludwig Becker (who died in the Burke and Wills Expedition across the Australian Continent), when making the drawing for our plate from a living specimen, wrote thus to me on this point :—" The specimen while alive was able to open its mouth so much that the upper and lower jaw formed an angle of nearly eighty degrees. Palate and tongue pale flesh-color. The flexibility of the spine was seen while the poor animal was crying either from pain or for food ; it could raise the head two feet and a half from the floor while still the sternum was level with the belly, and the head when raised was bent backwards. At the same time the spine from above the pelvis to the tail moved right and left. The sound was somewhat between a roaring and a grunting noise, not very strong."

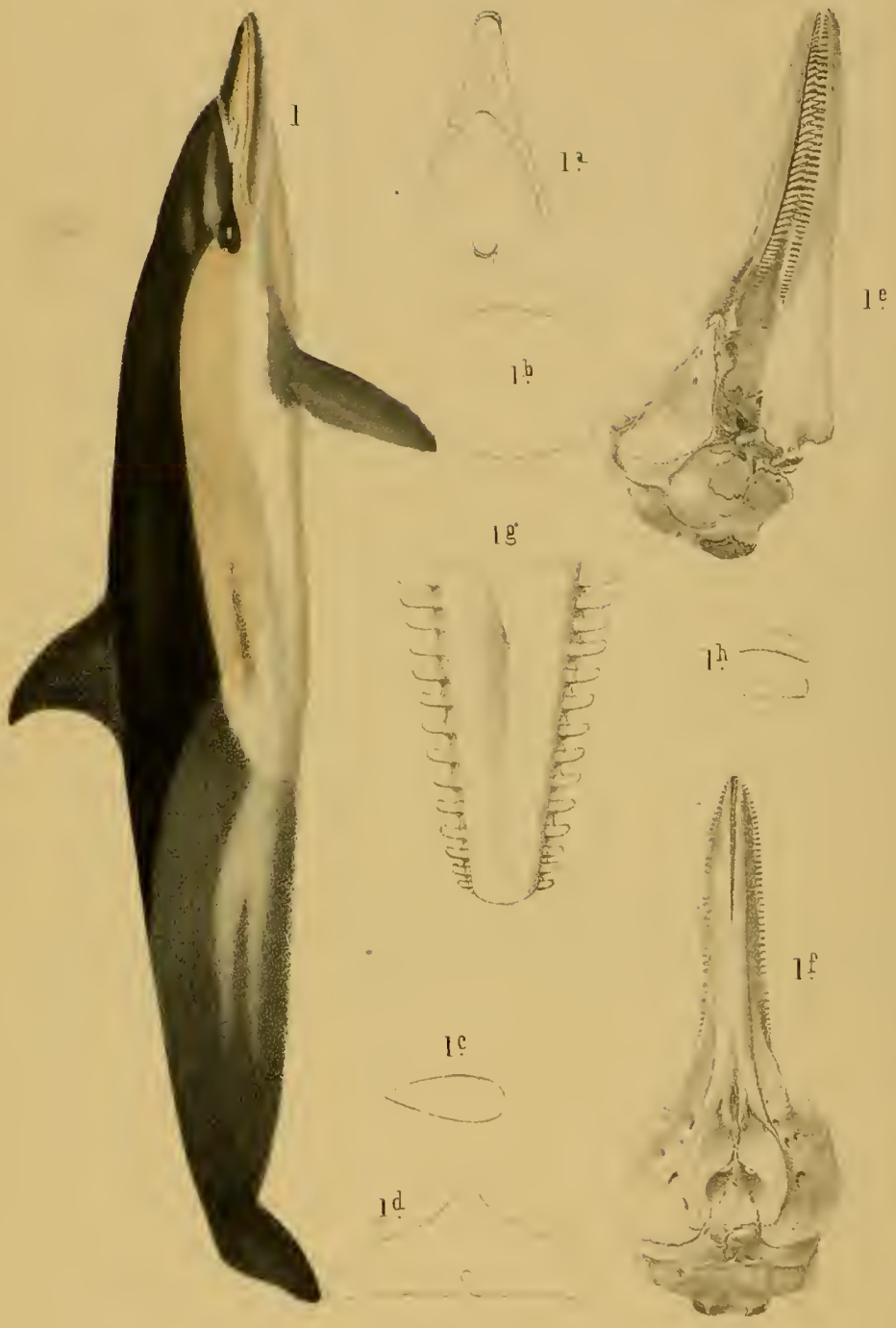
This species abounds in countless myriads on the packed ice of the Antarctic Ocean, and only occurs on our shores as an occasional visitant strayed from its usual haunts.

Fine specimens from the Victorian coasts are in the National Museum.

EXPLANATION OF FIGURES.

PLATE 21.—Fig. 1, specimen, of average color, when at rest, viewed from the side, one-twelfth the natural size. Fig. 1*a*, side view of skull, one-sixth the natural size. Fig. 1*b*, front view of same, one-sixth the natural size. Fig 1*c*, half of palate, showing proportion and position of teeth, and the palatal vacuity ; reduced one-half. Fig. 1*d*, similar view of teeth of lower jaw. Fig. 1*e*, third molar, lower jaw, natural size.

FREDERICK McCOY.



F. Schönfeld lith. *Prof. M.Coy dirext* *Hamel & Cº imp.*

PLATE 22.

DELPHINUS NOVÆ ZEALANDIÆ (QUOY AND GAIM.).

THE YELLOW-SIDED DOLPHIN.

[Genus DELPHINUS (LIN. as restricted by GRAY). (Sub-kingd. Vertebrata. Class Mammalia. Order Cetacea. Fam. Delphinidæ.)

Head and forehead rounded, with a suddenly narrowed beak in front, separated by a transverse groove from the head. Dorsal fin falcate, in middle of back. Pectoral fin elongate, falcate. Skull with hind wings of maxilla horizontal; nose much longer than the head, tapering, depressed in front, wider than high, nearly parallel-sided, convex above, slightly concave in front of blow-hole. Teeth subequal, pointed, incurved, $\frac{40}{45}:\frac{40}{45}$ to $\frac{60}{65}:\frac{60}{65}$, extending along greater part of the length of each jaw.]

DESCRIPTION. — *Teeth:* $\frac{45.45}{44.44}$. Body rounded in front, tapering behind, becoming much compressed and carinated above from about half-way between the end of the dorsal and the caudal fins; snout, narrow cylindrical, depressed above, pointed in front. *Color:* upper part of body glossy rich black as far as half-way between dorsal fin and tail, beyond which the posterior part of the body is dark slate-color; edge of upper jaw, lower jaw, and belly dull-whitish; pectorals blackish above, whitish below; dorsal dull-whitish or leaden-grey in middle, the margins darker; eye moderate, dark-brown, surrounded with a black margin extending as a narrow streak forwards to join the black of the head, at front of triangular groove; the upper and lower edges of this black mark being margined with white. A large, wide, dull yellow-ochre colored patch extends on each side from the eye backwards nearly as far as the hind edges of dorsal, widening on middle of side and then tapering to posterior end. Skull.—Palate deeply concave along each side behind, middle very prominent.

MEASUREMENTS OF MODERATE-SIZED SPECIMEN.

	Ft.	ins.
Length from tip of lower jaw to centre of tail	5	1½
„ from tip of snout to anterior edge of blower	1	0
„ from tip of snout to anterior point of triangular furrow in front of forehead	0	4¾
„ from tip of snout to eye	0	10¾
Girth behind pectorals...	2	3½
Length from tip of snout to front of pectoral	1	4¾
„ from tip of snout to front of dorsal	2	4½
„ of pectoral	0	9
Greatest width of pectoral	0	3
Height of dorsal along front edge	0	8
Length along base of dorsal	0	6½
Width of tail	1	0
Length of skull from condyles to tip of snout	1	5½
Lower jaw projecting 4 lines beyond upper jaw—		
Length of lower jaw	1	2¾
„ of dental series of lower jaw	0	8½
„ from tip of snout to anterior edge of blowers on skull...	1	0½

REFERENCE.—Quoy and Gaimard, Voyage de l'Astrolabe.—Pl. 28, f. 1.

This is the only Dolphin, or "Bottle-nose," as sailors say, which I have noticed on the Victorian coasts. It not unfrequently visits Hobson's Bay, generally in August, and following shoals of Pilchards or other fish, on which it feeds.

EXPLANATION OF FIGURES.

PLATE 22.—Fig. 1, side view, natural colors, reduced; the position of the blowers marked by the spouting. Fig. 1*a*, view of forehead and snout from above. Fig. 1*b*, form of section behind pectorals. Fig. 1*c*, form of section near tail, showing the compressed, sharp, upper mid-line. Fig. 1*d*, form of tail, viewed from above. Fig. 1*e*, side view of skull, reduced. Fig. 1*f*, skull, seen from below, showing the deep concave channel on each side of the narrow, prominent palate. Fig. 1*g*, extremity of lower jaw, viewed from above, natural size, showing length of symphyses and size and position of teeth. Fig. 1*h*, tooth from middle of jaw, natural size, viewed in front and profile.

FREDERICK McCOY.

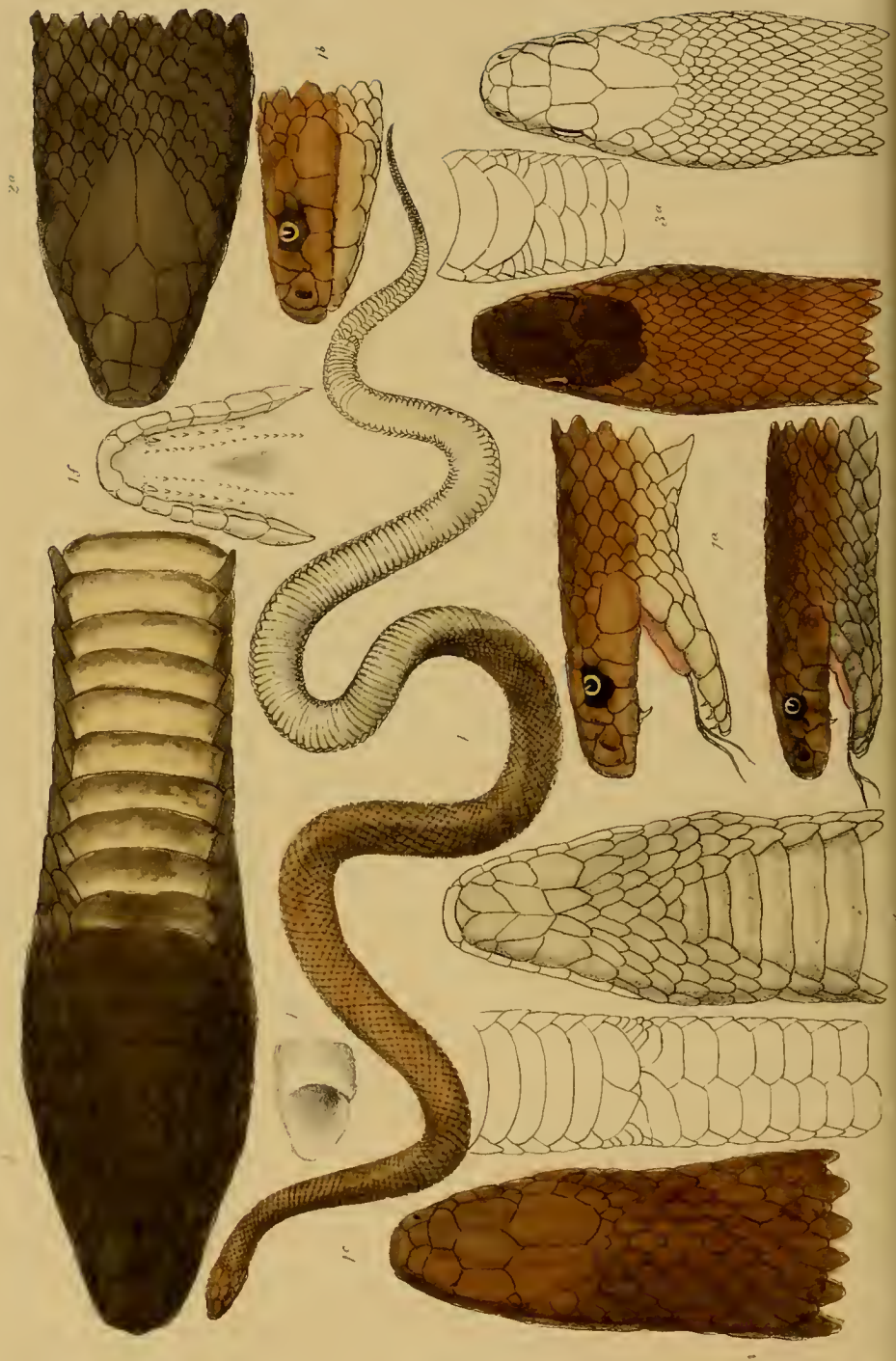


PLATE 23, FIG. 1.

DIEMENIA SUPERCILIOSA (FISCHER).

THE COMMON BROWN SNAKE.

[Genus DIEMENIA (GRAY). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Fam. Elapsidæ.)

Gen. Char.—Body and tail moderately stout; head subquadrate, muzzle blunt. *Plates:* rostral moderate, vertex plate narrow; loreal replaced by deflected posterior frontal, anterior ocular, second labial, and posterior nasal; oculars one, sometimes two, anterior, and two posterior; two nasals with nostril between them. Scales smooth, 15 or 17 rows on back; subcaudals in two rows. A row of small, equal, solid teeth behind the grooved fang. Australasia and New Guinea]

DESCRIPTION.—*Form:* body moderately stout, cylindrical; head only moderately exceeding the width of the neck, flat above, sides nearly vertical, converging to a narrow, rounded, blunt muzzle. *Scales:* 17 rows of scales across middle of back, large, flat, rhombic, and smooth; ventral plates, 190 to 216; subcaudals, 57 to 73; anal plate double. *Plates:* rostral shield one-fourth broader at base than high, obtuse-angled behind; anterior frontals small, quadrangular, nearly twice as wide as long; posterior frontals nearly twice the length of the anterior ones; vertex plate hexagonal, anterior angle so obtuse as to be scarcely marked, the length equalling the inner sides of the anterior and posterior frontals, the width in front nearly twice the width behind, or about two-thirds of the length. Parietal and occipital shields moderate. *Color:* color of head and upper part of body and tail nearly uniform olive-brown or warm sepia, with a slight bronze reflection; the lower surface of a lighter tint of pale yellowish-grey, the edges of the scales darker colored, with a glassy lustre; the anterior part of the belly freckled with pale-brownish spots, the hinder part dotted with grey; eyes black, with a yellow line round pupil; skin between the scales greyish. *Teeth:* 17 small, solid, equal palatine teeth on the left side, and 18 on the right in the specimen (Fig. 1); 6 small solid teeth behind the fang on the left side, and 7 on the right in same specimen.

The following are the numbers of scales in seven specimens counted in the Museum collection :—

Specimens.	Scales of Back.		Plates.		Length.	
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.	Tail.
					ft. ins.	ins.
1. Young, S. Brighton ...	17	15	190	46·46*	1 10	3¼
2. Average sp., Heidelberg...	17	14	204	57·57†	4 3	7½
3. Queenscliff	17	15	197	63·63‡	5 6	11
4. Murray Downs	17	14	200	57·57	3 6	6½
5. Sebastian, Sandhurst ...	17	15	201	73·73	3 6	7
6. Footscray	17	14	206	60·60§	4 5	9
7. Figured Pl. 23, fig. 1 ...	17	15	202	62·62	5 2	9¼

* Third and fourth subcaudal plates single. † Tip of tail absent. ‡ Four first single.
§ Second, third, fourth, and fifth single.

REFERENCE.—*Pseudoelaps superciliosus* (Fischer), Abhandlungen aus dem Gebiete der Naturwissenschaften, h. v. d., naturwissenschaftlichen Verein in Hamburg; vol. 3, t. 2, f. 3.

This is one of the largest of the poisonous and very dangerous snakes of the colony, and is more generally distributed than any of the others, being equally common from the south coast to our northern Murray boundary. In the experiments made by Dr. Halford on snake-poisoning, tabulated in the *Medical Society's Journal* for March 1875, all the cases of people bitten by the Brown Snake and treated by the injection of ammonia recovered; but in one of the last cases mentioned in the public journals (*Bendigo Advertiser*, 27th October 1877), a snake of this species, 3 feet 6 inches long (the fifth in above table of measurements), bit Mrs. Eleanor Ingleby, residing at Sebastian, in the hand, and she died from the effects within fifty minutes. The acting coroner, Mr. Strickland, who held the inquest, sent the specimen to the Museum, where it is now deposited, so that the species is determined with certainty.

EXPLANATION OF FIGURES.

PLATE 23.—Fig. 1, average specimen, one-fifth the natural size. Fig. 1*a*, side view of head, natural size (the groove in front of the eye not sufficiently shaded to indicate the projection of the eyebrow and apparent division of the first ocular). Fig. 1*b*, same, with mouth closed, groove in front of the eye not sufficiently shaded. Fig. 1*c*, view of the top of the head, natural size, to show the form and disposition of the plates. Fig. 1*d*, same viewed from below. Fig. 1*e*, nasal plates with nostril. Fig. 1*f*, inside of palate of same specimen, natural size, showing the two small fangs with the row of smaller solid teeth behind on each side, and the two palatine rows of small, solid teeth.

PLATE 23, FIGS. 2 AND 3.

DIEMENIA MICROLEPIDOTA (McCOY).

SMALL-SCALED BROWN SNAKE.

DESCRIPTION.—General appearance of *D. superciliosa* and with a similarly small rostral plate; but the vertex plate is nearly pentagonal, from the broad front being almost destitute of angle, forming the greatest width of the plate, which is three-fourths of its total length, the sides converging backwards to the narrow posterior end; posterior frontals proportionally much more elongate, more than twice the length of the anterior frontals, and the occipital plates much narrower behind. The scales are also much smaller and more numerous, being 30 or 36

across the neck, 23 across the middle, and 17 over base of tail. The ventral scales are also more numerous, being from 232 to 237, the anal one being undivided, while the subcaudals are only 61 to 66. *Color:* dark-brown above, yellowish-grey below, the ventral scales edged and blotched with dark-grey; one specimen with the head sooty-black gradually passing into blackish-brown on the body and tail. The general size is larger than the Common Brown Snake.

This large well-marked species is only found in the warmer northern parts of the colony. It is very easily distinguished from the Common Brown Snake (*D. superciliosa*) by the greater number of rows of scales across the back, and their obviously much smaller size and greater number, particularly across the neck. The two type specimens in the Museum have the following dimensions and numbers of scales :—

Specimens.	Scales of Back.		Plates.		Length.		
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.		Tail.
					ft.	ins.	ins.
Pale-brown sp.	23	17	237	66·66	4	9	7½
Large blackish-brown sp.	23	17	232	61·61	6	1	10

Locality, junction of Murray and Darling.

Explanation of Figures.

Plate 23.—Fig. 2, under side of head and neck, natural size, of large dark specimen. Fig. 2*a*, upper side of head of same specimen, showing the long posterior frontals, the broad-fronted, nearly pentagonal vertex plate, and the narrow occipital plates converging to the wedge-shaped posterior end. Fig. 3, head of smaller specimen, natural size, showing also the long posterior frontals, broad-fronted pentagonal vertex plate, and wedge-shaped posterior narrowing of the occipitals; as well as the smaller and more numerous scales when compared with fig. 1*c*, showing head, of nearly the same size, of *D. superciliosa*. Fig. 3*a*, under side of base of tail of same specimen, natural size, showing the undivided anal plate.

Plate 23, Fig. 4.

DIEMENIA ASPIDORHYNCHA (McCoy).

The Shield-fronted Brown Snake.

Description.—General appearance of *D. superciliosa*, but the head narrower, and with the front of the muzzle truncated instead of being rounded; and with a very much larger rostral plate extending backwards over the top of the head more than

twice as far relatively as the rostral shield of *D. superciliosa* or *D. microlepidota*, equalling in backward extension the anterior and posterior frontals together. The posterior frontals are but little longer than the anterior ones, contrasting in this respect strongly with *D. microlepidota*. The vertex plate has the pentagonal form, broad front, and backward-converging sides of *D. microlepidota*, but is shorter and more obtuse-angled behind, contrasting with the angular front and parallel sides of the hexagonal, vertex plate of *D. superciliosa*. The occipital plates agree with *D. superciliosa* in being shorter, broader, and widely rounded behind, contrasting in this respect with *D. microlepidota*. *Color:* a dark, rich, warm sepia-brown above, dark-greyish below, with lighter edges to scales; plated part of head very dark-brown or brownish-black. *Scales:* moderate, 24 or 20 across neck, 17 across middle of back, 15 over base of tail; abdominal scales, 219, anal scale divided; subcaudals, 55 on each side. *Teeth:* 16 in each palatine row; 7 on one side and 4 on the other behind the fangs. The anterior grooved ocular plate often appearing (erroneously) divided into two. Length: total, 4 feet 8 inches; tail, 8 inches.

In the enormous size of the rostral shield, its great backward extension over the crown, and in the size and shape of the frontals and vertex plate, this species agrees with the *Pseudonaja nuchalis* of Günther, but it is not banded, and presents no generic difference from the other two Brown Snakes above described, and certainly belongs to the genus *Diemenia*.

Explanation of Figures.

Plate 23.—Fig. 4, head, natural size, viewed from above. Fig. 4*a*, side view of same specimen.

Frederick McCoy.

E. Gibbs del. et lith.

Prof. McCoy direxit.

J. M. Ferguson imp.

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PLATES 24, 25, 26.

POLYZOA.

The number of observers with the microscope is so considerable in Victoria that it seemed to me particularly desirable to take advantage of the microscopic skill and powers of observation of some of my friends to present the means of readily identifying some of the more easily preserved, beautiful, and interesting of the minute members of the animal kingdom found in the colony. From the *Polyzoa* presenting these recommendations in a high degree, and an exact determination of our living species being likewise of great prospective interest to the geologist, as a necessary preliminary to the right understanding of the numerous species occurring in our Tertiary formations, I several years ago mentioned to my friend Mr. P. H. MacGillivray, so well known for his studies of this group, my desire to publish in this work all that were known on our shores ; and I have to express my greatest thanks to him for immediately presenting a series of his specimens to the National Museum, and furnishing me with his notes on them. The specimens I have had most carefully figured, the three following plates giving the species of the genera *Catenicella* and *Membranipora*, represented in all the views that seemed needful for the easy and certain recognition of the species.

PLATE 24, FIG. 1.

CATENICELLA MARGARITACEA (BUSK).

[Genus CATENICELLA (BLAINV.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Catenicellidæ.)

Gen. Char.—"Cells arising one from the upper and back part of another by a short corneous tube, all facing the same way and forming dichotomously divided branches, of an erect phytoid polyzoary; cell at each bifurcation geminate ; each cell with two lateral processes, usually supporting an avicularium. Ovicells either subglobose and terminal, or galeriform, and placed below the opening of a cell in front." The species of *Catenicella* abound in the Australasian seas, to which they are almost confined.]

DESCRIPTION.—Cells widely ovate. Fenestræ 5. Lower lip with a minute rounded notch. Lateral processes large; avicularium large, supporting a widely-open cup-shaped process above. Back of cell finely sulcated.

REFERENCE.—Busk, Voy. Ratt., i., 356; Cat. Mar. Pol. Brit. Mus., t. 6, f. 1, 2, 3.

Forms dense tufts, 2 to 4 or 5 inches high, of a reddish-brown color; common on the Victorian coasts.

This species is readily distinguished by the number of the fenestræ, the slight notch in the lower lip, the form of the lateral processes, with the widely-open, superior, cup-shaped, chamber, and the sulci on the back of the cells.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 1, natural size. Fig. 1*a*, front view of a branchlet, magnified. Fig. 1*b*, back view of ovicell, magnified. Fig. 1*c*, front view of ovicell, magnified. Fig. 1*d*, back view of a branchlet, magnified.

The species of this genus may be divided into five well-defined groups. The first, *Fenestratæ** of Busk, is distinguished by the presence of a certain number of marks or fenestræ on the front of the cell, caused by the deficiency of the ectoderm at these points. The species are mostly of large size, and the ovicells are large and terminal. In the second group, *Vittatæ*† of Busk, there are no fenestræ, but there is a narrow lateral or sublateral band or vitta on each side. The ovicells are of two forms, either on the summit of a cell of a series and cemented to the succeeding one, which is sessile, so that the three form a continuous mass; or they are terminal, and situated on the summit of a cell of a geminate pair. They are usually small species. The third group, *Simplices* of Busk, comprising the single species *C. carinata*, has neither fenestræ, vittæ, nor any other appendage, except the peculiar transversely spreading lateral processes. The fourth group, *Auritæ*‡ of Wyville Thomson, has neither true fenestræ nor vittæ, and is distinguished oy the presence of several thick blunt hollow processes on the upper edge of the mouth. The fifth group, *Fasciatæ* of Thomson, consists of the single species *C. Harveyi*.

* *Fenestratæ* includes *C. margaritacea, plagiostoma, ventricosa, hastata, rufa, cribraria, alata, lorica, intermedia.*

† *Vittatæ* includes *C. formosa, elegans, perforata, Buskii, Hannafordi, crystallina, cornuta.*

‡ *Auritæ* includes *C. aurita, geminata.*

The lateral processes, the characteristics of which are largely used in the discrimination of the species, can, in many, be seen to consist of three divisions, the middle one being the true avicularian chamber. One or more of the divisions may be largely developed, abortive, or wanting.

In addition to the species here described, *C. amphora* and *umbonata* of Busk, and *castanea* and *Harveyi* of Thomson—which have been found in Bass's Straits—are certain to occur on our coasts; and there is no doubt that a careful search will add several undescribed forms to the list.

PLATE 24, FIG. 2.

CATENICELLA PLAGIOSTOMA (BUSK).

DESCRIPTION.—Cells large, wide. Fenestræ 5, very large. Mouth lofty, directed obliquely to one side of the cell. Lateral processes very wide, consisting of an avicularium surmounted by a wide hollow fringe. Avicularia of two sorts, of moderate size, or very much elongated and exceeding half the length of the cell. The back of the cell with a broad longitudinal band, from which proceed, on either side, two narrow bands, one to the avicularian process, the other across the middle of the cell. Ovicell very large.

Var. *α lævis.*—Back of cell destitute of spines.

Var. *β setigera.*—Back of cell with small setose spines in the intervals between the dorsal band and its branches.

REFERENCE.—Busk, Voy. Ratt., i., 358; Cat. Mar. Pol. Brit. Mus., t. 5, f. 1, 2.

Very common, forming handsome, dense, reddish tufts, 3 or 4 inches high.

This is one of the most peculiar species of the genus. The cells are very broad, the front almost entirely occupied by 5 fenestræ, the real nature of which is here probably better shown than in any other species. The marks on the back of the cell are produced in the same manner as the fenestræ in front, the broad mesial and the narrow diverging bands consisting of the ectoderm which is deficient in the other parts, as it is in the fenestræ in front. The mouth of the cell is very lofty and directed obliquely to one side, which is constant in all the cells of the same series, and follows the same direction as that of the geminate cell from which

it arises—the mouths of the geminate pair being directed towards each other. The form and arrangement of the avicularia present a very marked feature. On all the cells there is a small avicularium with a sharp-pointed mandible, lodged in the edge of one or both lateral processes; while in many cells this position is occupied, on one side, by an avicularium of enormous size, frequently nearly equalling the cell in length. These large avicularia, when present, are situated on that side of the cell towards which the mouth inclines.

The ovicell is of large size, and surmounted by an avicularium sessile on a thick calcareous process. Encircling and forming the upper rim of the mouth is a large semilunar plate on each side, the two being united together in the mesian line.

Of the two varieties the first is very common, the second of much rarer occurrence.

Explanation of Figures.

Plate 24.—Fig. 2, natural size. Fig. 2*a*, front view of ordinary single and double cells, magnified. Fig. 2*b*, front view of a cell with an ovicell, magnified. Fig. 2*c*, back view of ovicell, also single and double cells, magnified.

Plate 24, Fig. 3.

CATENICELLA VENTRICOSA (Busk).

Description.—Cells ovate. Fenestræ 7, pyriform or with a line from the pointed inner extremity. Lower lip entire, notched, or with a small suboral foramen. Lateral processes of moderate size, the upper division generally pointed upwards. Back of cell smooth.

Reference.—Busk, Voy. Ratt., i., 357; Cat. Mar. Pol. Brit. Mus., t. 2, f. 1, 2; t. 3, f. 1–5.

Forms large, dense, brownish tufts, 3 or 4 inches high, and is of common occurrence. It is readily distinguished by the number and arrangement of the foramina, and by the smooth back of the cell.

Explanation of Figures.

Plate 24.—Fig. 3, natural size. Fig. 3*a*, front view of a branchlet, magnified. Fig. 3*b*, back view of a single and double cell, magnified.

PLATE 24, FIG. 4.

CATENICELLA HASTATA (BUSK).

DESCRIPTION.—Cells ovate. Fenestræ surrounding a scutiform area, and with intermediate fissures radiating towards the median line. Lateral processes very wide, the upper portion with several small perforations. Back minutely sulcate.

REFERENCE.—Busk, Voy. Ratt., i., 355; Cat. Mar. Pol. Brit. Mus., t. 2, f. 3, 4.

Queenscliff, Western Port, Cape Otway, and other localities; frequent.

Forms thick brownish-white tufts, 1 to 3 inches high. It is readily distinguished by the peculiar scutiform arrangement of the fenestræ and intermediate fissures, and by the perforated superior lateral processes.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 4, natural size. Fig. 4*a*, front view of a branchlet, showing single and double cells with ovicell also, magnified. Fig. 4*c*, back views of ovicell with ordinary cells also, magnified. Fig. 4*b*, drawn by mistake, back of cells with adherent extraneous matter.

PLATE 24, FIG. 5.

CATENICELLA RUFA (P. MACGIL.).

DESCRIPTION.—Cells vase-formed. Front with numerous round fenestræ, the circumferential being the largest. Mouth with a notch in the lower lip. Lateral processes small and pointed. On the back of the cell an elevated band runs up the middle, sending a narrow branch horizontally to each lateral process, and a small band extends up each side. Ovicells large, cribriform, surmounted by two avicularia.

REFERENCE.—P. H. MacGillivray, Trans. Royal Soc. Vict., 1868.

Common, forming handsome reddish-brown tufts, 4 or 5 inches high.

This and the next species, although presenting many points of resemblance, are easily distinguished. The cells in both are of nearly the same size and form, and are cribriform in front. In

both the exterior foramina are of much larger size, and usually form a distinct series round the edge of the cell. Both have frequently a semicircular area beneath the mouth more elevated than the rest, and both are destitute of the upper appendage of the lateral process.

In *C. cribraria* the lower lip is entire, and there is a crescentic pore a short distance beneath it; the avicularia are lodged in deep gaping excavations in the tolerably large lateral processes; and the back is smooth and destitute of any special marks. In *C. rufa*, the lower lip presents a constant notch; the lateral processes are small and pointed, and the notch for the avicularium is very shallow and inconspicuous; and the back of the cell is occupied by a broad mesial band connected inferiorly with two narrow lateral ones, and sending off superiorly on each side a narrow band to join the lateral in the avicularian processes. In this and the next species the fenestræ are probably formed by the opening of small tubercles.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 5, natural size. Fig. 5*a*, front view of ovicell, with other cells attached, magnified. Fig. 5*b*, front view of a branchlet of cells, magnified. Fig. 5*c*, back view of ovicell, magnified. Fig. 5*d*, back view of branchlet, magnified.

PLATE 24, FIG. 6.

CATENICELLA CRIBRARIA (BUSK).

DESCRIPTION.—Cells oval or subglobular. Surface cribriform, with a suboral lunate pore, the circumferential foramina being largest. Lateral processes destitute of superior appendage, deeply excavated for the reception of the avicularia, and produced inferiorly as a narrow fringe along the side of the cell. Back of cell smooth.

REFERENCE.—Busk, Voy. Ratt., *i.*, 359; Cat. Mar. Pol. Brit. Mus., t. 5, f. 3, 4.

Queenscliff, Sealers' Cove, Western Port, and other localities.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 6, natural size. Fig. 6*a*, front view of a branchlet of single and double cells, magnified. Fig. 6*b*, back view of cells, magnified.

PLATE 24, FIG. 7.

CATENICELLA ALATA (WYV. THOMSON).

DESCRIPTION.—Cells pyriform. Fenestræ, 5–7. Lateral processes very large, extending as a broad flat fringe the whole length of the cell. Back of cell minutely sulcate.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, April 1858, quoted in Microscopical Journal, 1859, p. 143.

Queenscliff.

Forms small tufts of a pinkish color, about an inch high, growing on polyzoa and algæ. It is at once distinguished from the other species by the enormous width of the lateral processes, each of which is as large as the cell. The avicularian chamber is a long narrow tube, expanding in the outer half and contracting at the orifice. There is a constant pyriform or triangular opening in the process immediately above the avicularian chamber, and generally one or more irregular ones in the lower part of the fringe.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 7, natural size. Fig. 7*a*, front view of cells, magnified. Fig. 7*b*, back view of cells, magnified.

PLATE 24, FIG. 8.

CATENICELLA LORICA (BUSK).

DESCRIPTION.—Cells elongated, truncated at both ends. Fenestræ, 3, two below the mouth, and one median much larger. Lateral processes of considerable size. Back of cell minutely sulcate.

REFERENCE.—Busk, Voy. Ratt., i., 358; Cat. Mar. Pol. Brit. Mus., t. 1, f. 1–3.

Queenscliff and elsewhere; not common.

Forms tufts one or two inches high, of a dirty reddish-white color. Beneath the third division of the lateral process, which is

very wide and covered by a thin membrane, is another similar closed compartment extending almost to the base of the cell. This gives to the cell a peculiar hexagonal or rhomboidal figure, which, with the constant three foramina, at once distinguishes this from the other species. The ovicell is of large size, surmounted by a single avicularium.

Explanation of Figures.

Plate 24.—Fig. 8, natural size. Fig. 8*a*, front view of cells, with ovicell, magnified. Fig. 8*b*, back of cells, magnified.

Plate 24, Fig. 9.

CATENICELLA FORMOSA (Busk).

Description.—Cells pyriform or subglobular; in front covered with numerous papillæ; a broadly linear or elliptical vitta extends up each side. Lateral processes large, straight or nearly so above, produced downwards as a narrow fringe, a round perforation at the base of each. Avicularia small, lodged in shallow excavations. Back of cell smooth.

Reference.—Busk, Voy. Ratt., i., 360; Cat. Mar. Pol. Brit. Mus., t. 7, f. 1, 2.

Queenscliff, Cape Schanck, Rivoli Bay, and other places.

This, the largest as yet known of the vittate division, forms handsome dusky-brown tufts. The cells are broadly pyriform or subglobose. The front is covered with minute, pointed, papillæ, and has, on either side, a broad vitta, extending from the base to nearly the level of the lower lip. The lateral processes are large, straight above, generally projecting a little upwards, and produced inferiorly into a narrow fringe usually running to the base of the cells; on each process there is at the base nearly opposite the lower lip a constant round opening; the avicularium is of small size, and lodged in a shallow excavation in the edge of the lateral process.

Explanation of Figures.

Plate 24.—Fig. 9, natural size. Fig. 9*a*, front view of cells, magnified. Fig. 9*b*, back view of cells, magnified.

PLATE 24, FIG. 10.

CATENICELLA ELEGANS (BUSK).

DESCRIPTION.—Cells ovate, papillose in front. Vittæ sublateral, extending about half-way up the cell. Lateral processes large, projecting slightly forwards, blunt, with an excavation under the point for the small avicularium. Ovicell superior, projecting on the surface of the cell above, with which it is incorporated, with a smooth margin.

REFERENCE.—Busk, Voy. Ratt., i., 361; Cat. Mar. Pol. Brit. Mus., t. 9, f. 3, 4.

Forming small glassy tufts, 1 to 2 inches high; frequent.

This is distinguished from the other small vittate species by the short sublateral vittæ and imperforate lateral processes. The ovicell is of similar structure to that of *C. Buskii*, but the upper edge is smooth. Thomson's *C. Dawsoni*, judging from his description and figure, and from specimens which seem referable to it, I believe to be a form of this species.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 10, natural size. Fig. 10*a*, front view of a branchlet of cells, magnified. Fig. 10*b*, back view of cells, magnified.

PLATE 24, FIG. 11.

CATENICELLA PERFORATA (BUSK).

DESCRIPTION.—Cells elongated, minutely papillose in front. Vittæ narrow, lateral, extending the whole length of the cell. One or both lateral processes usually large, triangular, pointed forwards, perforated at the base, or forming a blunt cupped process. Ovicell galeate, sessile on one of the cells of a geminate pair, terminal, smooth, or slightly tuberculate.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., t. 8, f. 1, 2.

Not uncommon.

In most of the specimens with ovicells the lateral processes are very small.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 11, natural size. Figs. 11*a* and 11*c*, front view of cells, magnified. Fig. 11*b*, front view of double cell with ovicell, magnified. Fig. 11*d*, back view of cells, magnified. Fig. 11*e*, back view of ovicell, magnified.

PLATE 24, FIG. 12.

CATENICELLA BUSKII (WYV. THOMSON).

DESCRIPTION.—Cells very much elongated, narrow. Vittæ very narrow and extending the whole length of the cells. Ovicell galeate, superior, projecting on the surface of the cell above, with which it is incorporated, with a beaded border.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, April 1858.

A small species growing on other polyzoa; rare. Readily distinguished from the other small species by the long, entirely lateral vittæ, and the adnate beaded ovicell.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 12, natural size. Fig. 12*a*, front view of a branchlet of cells with ovicell, and showing the side view also of some cells, magnified. Fig. 12*b*, another series of cells, front view, magnified. Fig. 12*c*, back view of cells, magnified.

PLATE 24, FIG. 13.

CATENICELLA HANNAFORDI (P. MACGIL.).

DESCRIPTION.—Cells wide, ovoid or subglobular. Lateral processes large, gaping, directed forwards, usually equal on both sides. Vittæ narrow, entirely lateral, extending the whole length of the cell. Anterior surface smooth, or very finely papillose; posterior surface faintly sulcate.

REFERENCE.—P. H. MacGillivray, Trans. Royal Soc. Vict., 1868.

Lady Bay, Portland, adhering to algæ; Mr. Hannaford.

This species may be distinguished by the large gaping avicularian processes, directed a good deal forwards, and almost surrounding the mouth and the narrow entirely lateral vittæ.

Its closest ally is *C. ringens*, which I have not seen.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 13, natural size. Fig. 13*a*, front view of a branchlet, showing single and double cells, magnified. Fig. 13*b*, back view of ditto, magnified.

PLATE 24, FIG. 14.

CATENICELLA CRYSTALLINA (WYV. THOMSON).

DESCRIPTION.—Cells pyriform. Lateral processes wide, extending as a broad fringe the whole length of the cell. Vittæ narrow, reaching as high as the mouth. Anterior surface smooth or with small papillæ. Back of cell sharply ridged.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, April 1868.

This species occurs in small glassy tufts on other polyzoa. It is readily distinguished from all the other vittate species by the very wide lateral processes which extend as a wide hollow fringe the whole length of the cell. There is generally a minute avicularium in a small cup-shaped depression, and there is usually an arched opening or mark in the fringe opposite the cell mouth.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 14, natural size. Fig. 14*a*, front view of a branchlet of cells, magnified. Fig. 14*b*, back view of a portion of ditto, magnified.

PLATE 24, FIG. 15.

CATENICELLA CARINATA (BUSK).

DESCRIPTION.—Cells pyriform. Lateral processes very much produced horizontally on either side. A minute denticle on either side of the mouth at the junction with the lower lip. A thin horny membranous area, below the lip, supports three small conical elevations. Back carinate. "Ovicelligerous cells geminate."

REFERENCE.—Busk, Voy. Ratt., i., 363; Cat. Mar. Pol. Brit. Mus., t. 6, f. 4, 5, 6.

Forms small brownish tufts, rare.

At once readily distinguished from all the other species by the peculiar horizontally spreading lateral processes, and the prominently ridged and umbonate back of the cell. In old specimens the suboral horny part is thickened and the protuberances are worn off, and there is then the appearance of three fenestræ.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 15, natural size. Fig. 15*a*, front view of a branchlet, showing side view of cells also, magnified. Fig. 15*b*, back view of single and double cells, magnified.

PLATE 24, FIG. 16.

CATENICELLA AURITA (BUSK).

DESCRIPTION.—Cells ovate or sub-globular. Front tuberculate, the larger tubercles towards the centre. Lower lip deeply notched. On each side of the mouth above are two or three thick, hollow, blunt processes, the upper the larger. Lateral processes large, with gaping avicularia.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., t. 4, f. 1, 2, 3.

Occurs in small whitish tufts, about half an inch or an inch high, attached to zoophytes and algæ.

In this species the appearance of the cell varies very much, according to the age and state of preservation of the specimen. In good specimens the front is richly tuberculate, and there are no perforations, or at most one suboral. With age or attrition the lateral tubercles disappear and the central larger ones are opened. In old specimens, as commonly seen, we have the appearance of 4 or 5 fenestræ surrounding a large, raised, suboral opening, as figured and described by Busk. The ovicell is situated on the summit of a single cell, and has a gaping avicularium on either side. The avicularium is generally much smaller or abortive on one side.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 16, natural size. Fig. 16*a*, front view of a branchlet of single and double cells, magnified. Fig. 16*b*, front view of two cells, one with ovicell, magnified. Fig. 16*c*, back view of single and double cells, magnified.

PLATE 24, FIG. 17.

CATENICELLA GEMINATA (WYV. THOMSON).

DESCRIPTION.—Axial cells geminate. Front tuberculate. Mouth surrounded above by several (4 or 5) blunt hollow processes. Lower lip deeply notched. From one cell of each geminate pair, except at a bifurcation, springs a single terminal wedge-shaped cell, surmounted by two hollow blunt processes.

REFERENCE.—Wyville Thomson, Dublin Natural History Review, April 1858.

Forms very small brownish-white tufts about half an inch high. Queenscliff, and probably in other localities.

This very curious species is readily distinguished from *C. aurita*, the only form to which it has any resemblance. All the axial cells in a branch are geminate. The bifurcations are numerous, at every third or fourth cell. From the secondary cell of each geminate pair, except those of bifurcation, springs a small wedge-shaped cell.

The mouths of the ordinary geminate cells are surrounded above by a series of 4 or 5 hollow blunt processes; the wedge-shaped peripheral cells are always surmounted by a pair of long, slightly diverging processes directed upwards.

EXPLANATION OF FIGURES.

PLATE 24.—Fig. 17, natural size. Fig. 17*a*, front view of a small branchlet, showing the axial double cells and the small lateral cells, magnified. Fig. 17*b*, back view of cells, magnified.

CATENICELLA CORNUTA (BUSK).

DESCRIPTION.—Cells elongated, papillose in front. Vittæ lateral, extending the whole length of the cell. One or both lateral processes long, pointed, and recurved, with a small aperture at the base. Ovicell galeate, sessile on one of the cells of a geminate pair, terminal, surmounted by a sharp spine.

REFERENCE.—Busk, Voy. Ratt., i., 361; Cat. Mar. Pol. Brit. Mus., t. 10, f. 1, 2, 3.

Forms small greyish tufts, 1 to 2 inches high. Queenscliff.

The only species with which this is likely to be confounded is *C. perforata*, from which it may be distinguished by the retrocedent spinous lateral processes, and by the spine on the summit of the ovicell.

CATENICELLA INTERMEDIA (P. MACGIL.).

DESCRIPTION.—Cells large, wide. Mouth vertical or nearly so. Front of cell with five large fenestræ. Lateral processes very wide, usually abortive on one side. Back of cell smooth.

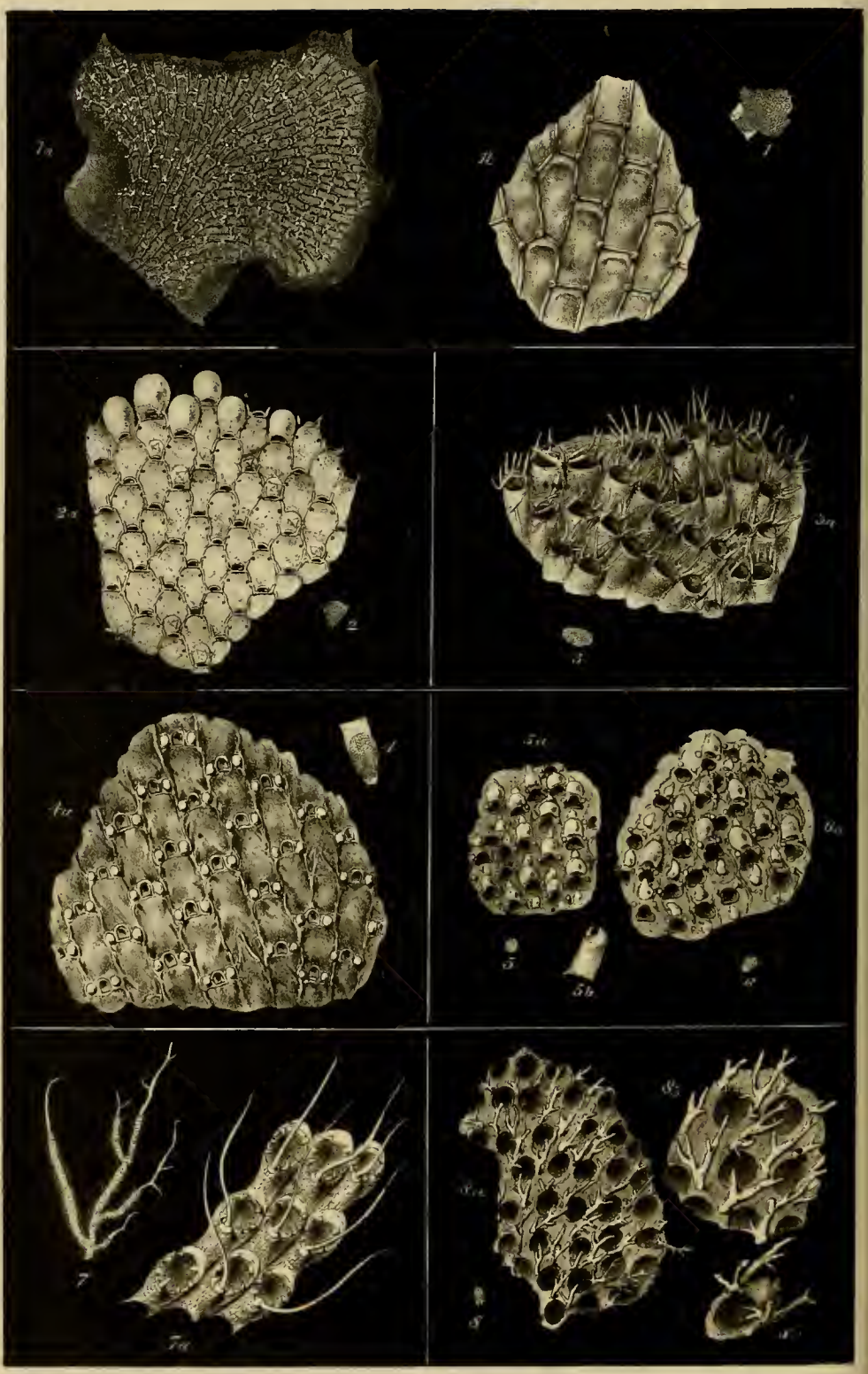
REFERENCE.—P. H. MacGillivray, Trans. Royal Soc. Vict., 1868.

Queenscliff.

From *C. plagiostoma*, to which it is closely allied, it may be distinguished by the following characters :—The mouth is straight, or nearly so ; the anterior foramina, although arranged in the same manner, are of smaller size ; there are none of the peculiar enormous spoon-shaped avicularia ; the back also is smooth. The large lateral process, with its tolerably large avicularium, usually exists only on one side of the cell.

Mr. Goldstein has furnished me with some notes and sketches of the animal of *C. margaritacea* observed by himself and Mr. Maplestone, of Portland, but wishes to confirm the observations before publication. The descriptions are from my friend Mr. MacGillivray. The two last species are given here to complete the series of species of *Catenicella* in the collection from our shores, although there was not room on the plate to figure them. I hope to figure them on another plate hereafter with some other additions.

FREDERICK McCOY.



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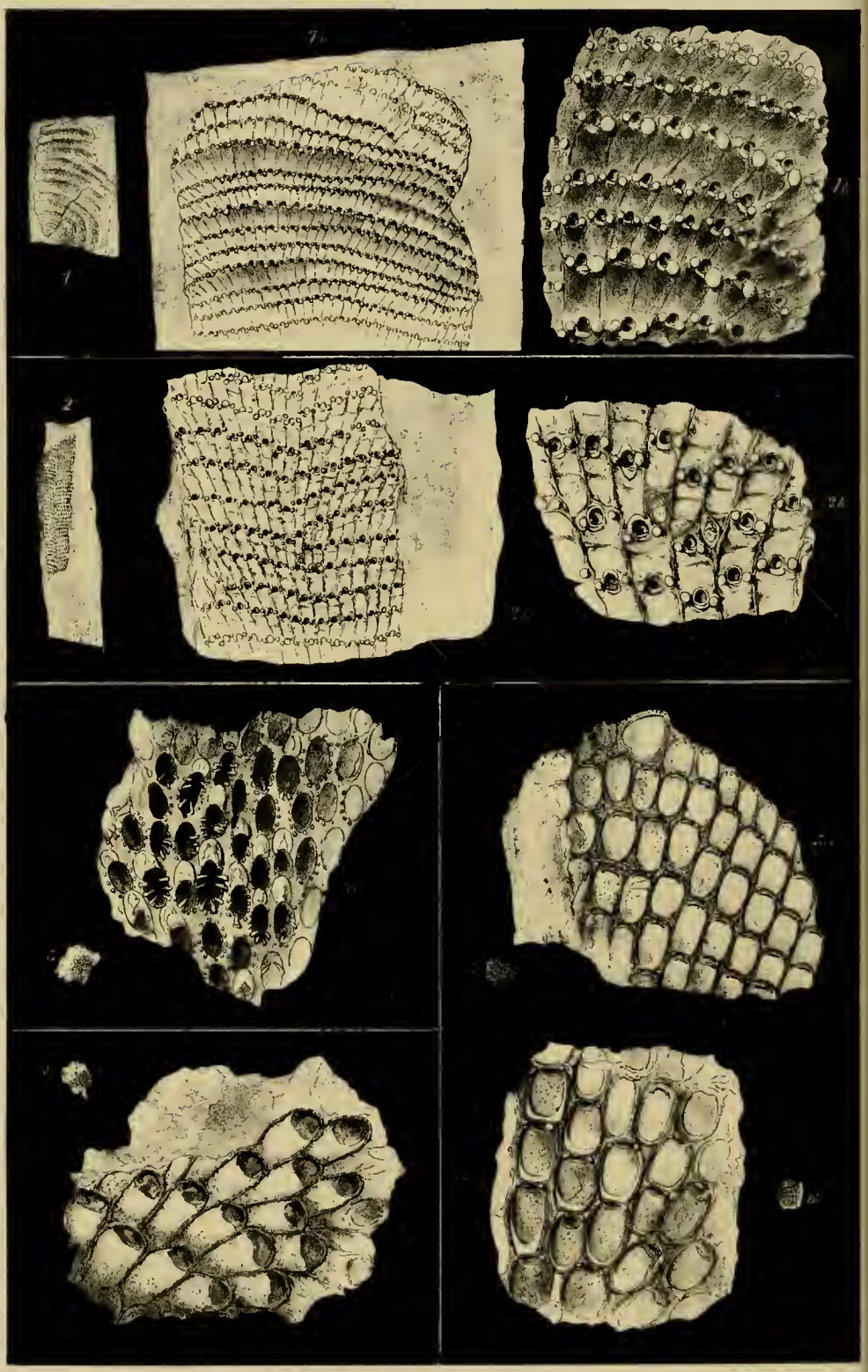
Pl. 5.

(Polyzoa)



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PLATES 25 AND 26.

Plate 25, Fig. 1.

MEMBRANIPORA MEMBRANACEA (Linn. sp.).

[Genus MEMBRANIPORA (Blainville). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Membraniporidæ.)

Gen. Char.—Polyzoary spreading, encrusting or occasionally suberect. Cells contiguous, irregular, quincuncial or in transverse and longitudinal series, separated by raised margins, front more or less membranous.]

Description.—Cells oblong, much longer than broad, straight or slightly rounded above, straight below, separated by raised margins; a short, blunt spine at either angle superiorly. Front entirely occupied by a thin membrane.

Reference.—*Flustra membranacea* (Linn.) Systema, 1301; Busk, Cat. Mar. Pol. Brit. Mus., p. 56, t. lxviii., f. 2.

The cells are of large size, 2 to 3 times as long as broad, nearly rectangular, and separated by prominent smooth, or slightly crenulated margins. They are arranged in lines, which frequently bifurcate and radiate, so as to give the whole cœnœcium a rounded or semilunar form.

Of frequent occurrence everywhere on our shores, creeping over broad seaweeds, on which it occasionally forms lace-like patches several inches in diameter.

Explanation of Figures.

Plate 25.—Fig. 1, specimen, natural size. Fig. 1*a*, same, magnified. Fig. 1*b*, cells, more highly magnified.

Plate 25, Fig. 2.

MEMBRANIPORA PERFORATA (P. MacGil.).

Description.—Cells very irregular in shape, generally obscurely hexagonal or pyriform; mouth narrow, with slightly thickened lips, and a stout spine at either side superiorly; front of cell minutely cribriform, with a large round opening on either side, close to the margin. Ovicell large, galeate, widely open beneath, granular. Avicularium usually at the base of a cell, mandible triangular, acute.

Reference.—P. MacGillivray, Trans. Phil. Instit. Vict., 1859.

Readily distinguished from all other species by the large circular opening on each side of the cells.

On algæ, frequent at Queenscliff and other places.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 2, specimen, natural size. Fig. 2*a*, same, highly magnified, showing the irregular form of the cells, the two sharp spines and several of the ovicells on the upper part of the figure, and the triangular avicularia on some of the cells.

PLATE 25, FIG. 3.

MEMBRANIPORA CILIATA (P. MACGIL.).

DESCRIPTION.—Cells oval; front almost entirely occupied by a calcareous granular membrane. A series of (4–7) long hollow spines articulated round the upper end of the cell.

REFERENCE.—P. MacGillivray, Trans. Roy. Soc. Vict., 1868.

It is at once distinguished by the series of long, thick, hollow, articulated spines, which are so large as to be distinctly visible without a lens, and frequently obscure the whole front of the cell. In the figure the cells are rather too prominent and the spines too small.

Occurs frequently in small patches on algæ at Queenscliff and Williamstown.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 3, specimen, natural size. Fig. 3*a*, same, highly magnified, showing the numerous long spines to aperture.

PLATE 25, FIG. 4.

MEMBRANIPORA MAMILLARIS (P. MACGIL.).

DESCRIPTION.—Cells oblong, arranged in longitudinal series, alternate; front entirely occupied by a thick membrane; mouth with a hollow, blunt spine on either side. Avicularium large, situated at the base of a cell, mandible triangular, much elongated, directed obliquely upwards.

REFERENCE.—P. MacGillivray, Trans. Phil. Instit. Vict., v. iv., p. 165, 1860.

It may readily be distinguished by the uniformity of size and alternate arrangement of the cells and by the size and obliquity of the avicularia.

This species occurs in small purplish patches on algæ at Queenscliff.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 4, specimen, natural size. Fig. 4*a*, same, highly magnified, showing the form and arrangement of the cells, aperture, and spines, with one avicularium near middle of lower part of figure.

PLATE 25, FIGS. 5, 6.

MEMBRANIPORA UMBONATA (BUSK).

DESCRIPTION.—Cells irregularly oblong or elliptical; margins scarcely raised; mouth arched above, straight below, frequently contracted about the middle, giving it a trifoliate appearance; a spine on either side. An avicularium on the summit of a thick cylindrical process on the front of each cell. Ovicell rounded or elongated, encroaching on the cell above.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 57, t. lxxiii., f. 6, 7.

Distinguished at once by the peculiar avicularium on the front of the cell, which is well shown in Fig. 6*a*.

On algæ, Queenscliff.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 5, portion, natural size. Fig. 5*a*, same, magnified. Fig. 5*b*, avicularium, magnified. Fig. 6, another specimen, natural size. Fig. 6*a*, same, highly magnified.

PLATE 25, FIG. 7.

MEMBRANIPORA PILOSA (LINN. SP.).

DESCRIPTION.—Cells elongated, narrow inferiorly, lower half filled in by a calcareous punctate expansion; margins of the opening bearing several (usually three on each side) short, pointed spines; a very long articulated vibraculum situated on the calcareous expansion immediately beneath the open part of the cell; mouth small, lunate.

REFERENCE.—*Flustra pilosa* (Linn.) Systema, 1301; Busk, Cat. Mar. Pol. Brit. Mus., p. 56, t. lxxi.

This, one of the most beautiful species of the genus, may at once be distinguished by the cribriform, calcareous lamina, and the long articulated vibraculum, which is usually so large as to be

distinctly visible to the unaided eye. The marginal spines are generally three on each side, short and pointed.

Common on algæ; everywhere on our shores.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 7, specimen, natural size. Fig. 7*a*, portion of same, highly magnified, showing the immensely lengthened vibraculum.

PLATE 25, FIG. 8.

MEMBRANIPORA CERVICORNIS (BUSK).

DESCRIPTION.—Cells oblong or oval, lower part filled in by a calcareous expansion; on either side of the aperture superiorly is a large branched process. Ovicell shallow, galeate, frequently surmounted by a small avicularium.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 60, t. c. f. 3.

This species is at once distinguished by the peculiar processes, branching like stags' horns. The Australian form differs slightly from that described and figured by Professor Busk. It has no marginal spines besides the superior branched ones, the branches of which are more slender and do not inosculate with those of the opposite spine, and the color of the polyzoary is white or brownish-white.

Williamstown, on *Sargassum;* plentiful.

EXPLANATION OF FIGURES.

PLATE 25.—Fig. 8, specimen, natural size. Fig. 8*a*, same, magnified. Fig. 8*b*, portion of same, more highly magnified to show more clearly the branching processes. Fig. 8*c*, ovicell magnified.

PLATE 26, FIG. 1.

MEMBRANIPORA DISPAR (P. MACGIL.).

DESCRIPTION.—Cells oblong, of two sizes, arranged in concentric series, a row of large cells being followed by two rows of short; mouth arched; a thick, blunt, hollow spine on each side of the mouth, in the larger cells of enormously disproportionate size.

REFERENCE.—P. MacGillivray, Trans. Roy. Soc. Vict., 1868.

The characters of this species are so peculiar that it is impossible to confound it with any other. The arrangement of the cells is very remarkable. They are of two sorts, the one form about twice the length of the other. One row of long cells is succeeded by a double row of short ones. In the short cells the oral processes are of nearly equal size, while in the long ones we have on one side of the mouth a small or moderate sized spine, and on the other a large bullate process.

Portland Bay, on algæ, a single specimen ; Rev. J. E. Tenison-Woods.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 1, specimen, natural size. Fig. 1*a*, portion of ditto, magnified. Fig. 1*b*, portion of same more highly magnified, showing the discrepancy of size in the rows of cells and the singularly large size of the hollow spines on the larger cells.

PLATE 26, FIG. 2.

MEMBRANIPORA WOODSII (P. MACGIL.).

DESCRIPTION.—Cells oblong, arranged in longitudinal and transverse series; front entirely occupied by a thick membrane; mouth large, arched above, concave below, with a blunt hollow spine on either side. Avicularium at the base of a cell, mandible broadly triangular, with the point rounded.

REFERENCE.—P. MacGillivray, Trans. Roy. Soc. Vict., 1868.

In the only two specimens I have seen, this species is readily recognized by the peculiar arrangement of the cells, diverging in slightly curved transverse rows from the mesial line, as shown in the plate. It may be distinguished from *M. mamillaris* by the marks pointed out under that species, and from the *M. dispar* by the cells being of uniform size, by the hollow lower lip of the mouth, and by the oral spines, although frequently differing in size, not presenting the same great disproportion.

Portland Bay, on algæ ; Rev. J. E. Tenison-Woods.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 2, specimen, natural size. Fig. 2*a*, portion of same, magnified to show the arrangement of the cells. Fig 2*b*, portion, more highly magnified, showing the mouth, spines, and two of the broad avicularia near the middle of figure.

PLATE 26, FIG. 3.

MEMBRANIPORA LINEATA (LINN. SP.).

DESCRIPTION.—Cells oval; margin with a series of spines, usually 5 on either side and one inferiorly, bending close over the aperture. Avicularia scattered, with a large spoon-shaped mandible. Ovicell galeate, obscurely carinate, and frequently with the lower half separated, anteriorly, by a slightly prominent semilunar ridge.

REFERENCE.—*Flustra lineata* (Linn.) Systema, 1301; Busk, Cat. Mar. Pol. Brit. Mus., p. 58, t. lxi., f. 1.

Schnapper Point; Port Fairy, Mr. Castwood; rare. The specimen figured, which is on a calcareous nodule attached to the root of a *Laminaria*, is a good deal worn, and most of the spines have been rubbed off. In other specimens they are perfect, arch forwards and almost entirely cover the aperture.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 3, specimen, natural size. Fig. 3*a*, same, highly magnified, showing the ovicells over the mouths in the middle of the figure, and the characteristic spines on the sides and lower part of the aperture, looking, when broken, like tubercles, as shown on the right-hand side of the figure.

PLATE 26, FIG. 4.

MEMBRANIPORA ROSSELII (AUDOUIN SP.).

DESCRIPTION.—Cells oval, separated by raised finely beaded margins; lower part of cell filled in by a calcareous, granular expansion.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 59, t. c. f. 2.

Encrusting earthy nodules attached to the roots of algæ. A small elegant species. The calcareous expansion generally occupies about two-thirds of the cell, and is minutely granular, the granulations diminishing in number towards the upper part.

I have considerable doubt in referring this to *M. Rosselii*, and am not satisfied that it is not a form of *M. Lacroixii*.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 4, specimen, natural size. Fig. 4*a*, same, highly magnified.

PLATE 26, FIGS. 5, 6.

MEMBRANIPORA LACROIXII (SAVIGNY SP.).

DESCRIPTION.—Cells oval or elongated; margins thick, strongly beaded; usually a short, blunt spine at either side superiorly.

REFERENCE.—*Flustra Lacroixii* (Savigny), Egypt, t. 10, f. 9; Busk, Cat. Mar. Pol. Brit. Mus., p. 60, t. lxix., t. civ., f. 1.

In some specimens of this species the lower part of the cell is filled in by a thick calcareous expansion (Fig. 6*a*), which extends a considerable distance up the sides, while in others it is entirely wanting, or limited to the inferior angles. Although at first sight these two forms might appear to belong to distinct species, it is not difficult to trace all the gradations between them. In specimens dredged from the ledge of sandstone rocks, off Brighton, some have the front of the cell entirely occupied by a thin membrane (Fig. 5*a*), others have merely the lower angles filled by a thicker expansion, while others present the appearance shown in Fig. 6*a*. The spines on the upper part of the cell are by no means constant; sometimes they are quite distinct, at other times they appear as slight prominences on the cell-margins, and frequently they are altogether absent.

On shells at Queenscliff and Point Cook, and on sandstone rocks, in 4–6 fathoms, off Brighton.

EXPLANATION OF FIGURES.

PLATE 26.—Fig. 5, specimen, natural size. Fig. 5*a*, same, highly magnified, of the variety wanting the thickening at base of cells. Fig. 6, another specimen, natural size. Fig. 6*a*, same, highly magnified, showing the calcareous thickened margin at base of cells of the variety.

The above descriptions of *Membraniporæ* have been kindly furnished to me by my friend Mr. P. H. MacGillivray. I have spared no trouble to render the plates as perfect as possible, and the species can be identified from them with ease and certainty.

FREDERICK MCCOY.

1
2
2b
3
2a
1a

PLATE 27, FIG. 1.

GENYPTERUS AUSTRALIS (CAST.).

AUSTRALIAN ROCKLING.

[Genus GENYPTERUS (PHILLIPPI) = HOPLOPHYSIS (KAUP.) = XIPHIURUS (SM.) (Subkingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Ophidiidæ.)

Gen. Char.—Body elongate, compressed, tapering to a point at posterior end, which is surrounded by the continuation of the dorsal and anal fins, which are long and single; ventral fins replaced by a pair of bifid filaments; pectorals small, rounded; scales small, very numerous; teeth on the jaws in several rows, the outer row in front much thicker and longer than the others; row of teeth on the palate-bones and vomer larger than the largest on the jaws; lower jaw shorter than the upper; vent near middle of body; branchiostegal rays 7; pseudobranchiæ; an air bladder; and a small number of pyloric appendages; gills four.]

DESCRIPTION.—*Rays:* branchiostegal, 7; anal, 123 to 126; dorsal (to centre ray at end of tail), 159; ventral filaments with the hind ray longest; pectoral, 19 to 21. *Scales:* along lateral line about 300 (261 to 307); vertical rows of scales from front ray of dorsal to lateral line 17, below lateral line 65 to 70. *Color:* of head and body rich purplish-brown above, with a delicate lilac tint stronger towards the posterior end, irregularly marbled with confluent spots of dark vandyke-brown; cheeks and upper part of iris with a rich coppery-red bronze tint; lower part of iris silvery; lower part of the body and belly yellowish-white without mottling; dorsal fin dark-purple, mottled like the head and upper part of the body with irregular brown blotches, the extreme narrow margin whitish; anal fin lilac at base in front, with a narrow band of brown mottling, and a dull reddish-brown margin, with a narrow white line at the edge; the posterior portion of the fin becoming darker and entirely mottled like the posterior part of dorsal; pectoral fin brownish with a lilac tinge, mottled with dark-brown; throat and filamentous ventrals pale flesh-colored. Operculum terminating in an acute angle at soft posterior margin. *Teeth:* along upper jaw a row of large thick, conical, strong, outer ones, behind which are two or three irregular rows of very much smaller subequal cardiform ones; teeth of the palate-bones and vomer forming a nearly continuous single row of large conical teeth, rather larger than the outer ones of upper jaw; lower jaw with an outer row of larger conical teeth and an irregular inner row of smaller ones.

REFERENCE.—*Cast.*, Proc. Zool. and Ac. Soc. Vict., v. 1, p. 164; = *G. tigerinus*, Klunzinger Archiv für Naturgeschichte, 1872, p. 39.

The following are the dimensions of two moderate-sized specimens and a young one :—

Measurements.	Male.		Female.		Young.	
	ins.	lines.	ins.	lines.	ins.	lines.
Length from snout to distal end of caudal	30	6	30	0	15	3
„ of caudal	1	0	1	0	0	7
„ from snout to anterior edge of orbit	1	3	1	1	0	8
„ of orbit	0	10½	0	10½	0	6
„ of head from snout to end of operculum	6	10	6	3	3	4
„ from snout to anus (measured along ventral edge) ...	15	0	14	3	7	0
„ from anus to end of caudal	16	0	15	9	8	7
„ from snout to base of pectoral	6	5	6	0	3	2½
„ from snout to origin of dorsal	7	3	7	0	3	6½
„ of pectoral	2	1	1	9	1	2
Height of dorsal	1	5	1	5	0	7
Length of anal	15	6	15	6	7	0
„ of posterior ventral filament	2	5	2	1	1	2½
„ of anterior ventral filament	2	0	1	9	1	0
Width between eyes	0	9	0	7½	0	6
Depth of body in front of dorsal	5	0	5	6	1	10
Thickness of body in front of dorsal	4	3	4	6	1	3

Five scales in six lines at middle of body of the above large specimens, and nine in same space of the young one ; number of rows of scales above the lateral line the same in all.

I much doubt the propriety of separating this fish specifically from the *G. blacodes* of Foster.

Captain Hutton informs me, in reply to my enquiry, that the proportions given in his "Catalogue of the Fishes of New Zealand" for the large *Genypterus blacodes* of the southern coast of New Zealand, are erroneously printed as "length seven times that of the head," instead of four and two-thirds, and the length as "ten times the height of the body" instead of six times; which corrected proportions more nearly agree with the Melbourne fish. Dr. Günther's description of the *G. blacodes* being from such a small specimen would account for the greater size of the head and orbit in proportion to total length and length of head.

The lateral line ceases at about 2½ inches from the posterior end of the body in specimens of the above size (about 2½ feet) in the Melbourne examples. The stomachs of those opened were full of shrimps as in the European Rocklings (*Motella*), with which the colonial fisherman see some relation. It is not known whether our *Genypterus* makes the curious nest for preservation of its eggs, well known in the 5-bearded Rocklings of England.

Abundant on our coasts in the winter season ; not uncommon in the market, and moderately good for the table. It rarely reaches three feet in length, and is usually much less.

EXPLANATION OF FIGURES.

PLATE 27.—Fig. 1, average specimen, one-third the natural size. Fig. 1*a*, dentition of lower and upper jaws, vomer, and palate, natural size.

PLATE 27, FIG. 2.

GADOPSIS GRACILIS (McCOY).

THE YARRA BLACKFISH.

[Genus GADOPSIS (GÜNTH.). (Sub-kingd. Vertebrata. Class Pisces. Order Anacanthini. Fam. Gadopsidæ.)

Gen. Char.—Body moderately elongate, ovate ; head moderate, lower jaw much shorter than snout ; one dorsal fin, with spinous anterior rays and longer posterior portion with soft branched rays ; anal fin moderate, with three strong anterior spines. Dorsal and anal fins with a thick scaly skin on basal two-thirds of height ; caudal fin moderate and rounded, separate from dorsal and anal ; ventral fins jugular, each of a bifid filament ; branchiostegals seven ; gills four, with narrow slit behind fourth ; pseudobranchiæ glandular ; gill-opening wide ; gill-membranes not united ; an air bladder ; pyloric appendages moderate. Scales small, cycloid. Teeth small, cardiform, in numerous rows on the jaws, palate-bones, and vomer ; much larger conical teeth on outer row of jaws. Fresh water, Australia and Tasmania.]

DESCRIPTION.—*Form:* slender, elongate, the profile of back very slightly convex, nearly straight (more so than in *G. marmoratus*); profile of head moderately convex (less so than in *G. marmoratus*), concave over eye ; snout semi-oval, prominent ; lower jaw more broadly rounded and much shorter than the snout ; tubular anterior nostrils nearer to the end of snout than to the edge of orbit ; posterior ones simple, nearer to eye ; space between the eyes slightly convex ; operculum ending in a slightly acute angle with a small spine ; superior maxillary, when the mouth is closed, extending to vertical of posterior third of the eye ; small scales extending over the whole head, except the jaws, snout, and cheeks in front of the eyes. *Rays:* branchiostegal, 7 ; anal, 21, the first 3 short and spinous ; dorsal, 11 or 12 spinous, 26 or 27 not spined ; ventral, of two filaments, inner or hind ray longest ; pectoral, 16 to 17 ; caudal, 23 or 25. *Scales:* along lateral line, 100 to about 140 if the small terminal ones be counted ; vertical rows of scales from front ray of dorsal to lateral line, 21 to 23 ; below lateral line, 56 to 68. *Color*: extremely variable ; some specimens light olive-green, becoming yellowish-white towards the belly ; the back, sides, and fins marbled with distant, irregular patches of dark-brown ; other specimens have the dark-brown spots very much more numerous, smaller, and extending over the belly as well as over the head, back, sides, and fins ; such specimens having the smaller intervening spaces on the head, back, and sides dark brownish-olive, and with an orange tint on the base of the pectoral and belly ; iris silvery. *Teeth:* in

upper jaw, with 5 or 6 large conical ones at the outer edge on each side, within which is a band becoming narrower behind of about 7 rows of very minute cardiform ones, about 62 in the length; the patch of small cardiform ones on the palate-bones about 7 rows across; the small quadrate patch of cardiform teeth on the vomer slightly larger than those on the palate; lower jaw, with about 9 strong conical teeth on the outer edge, within which about 7 rows of minute cardiform ones. About 5 large mucous pits on each side below lower jaw.

The following are the dimensions of three specimens varying from the largest :—

Measurements.	Largest, Yarra.		Moderate, Watts'.		Smallest, Yarra.	
	ins.	lines.	ins.	lines.	ins.	lines.
Length from snout to distal end of caudal	25	0	9	7	4	11
„ of caudal	3	7	1	6	0	11½
„ from snout to anterior edge of orbit	1	6	0	9	0	4
„ of orbit	0	9	0	5	0	3
„ of head from snout to end of operculum	5	3	2	3½	1	0
„ from snout to anus, measured along ventral edge ...	14	3	5	1	2	5
„ from snout to base of pectoral	5	6	2	4	1	1½
„ from snout to origin of dorsal	7	1	2	9	1	3½
„ of pectoral	2	5	1	1	0	7½
„ of dorsal	12	0	4	10	2	4
„ of anal	4	6	2	2	1	0
„ of ventral, longer filament	2	0	1	3	0	7
„ of ventral, shorter filament	1	4	0	10	0	4
Width between eyes	1	2	0	6	0	3
Depth of body in front of dorsal	5	3	1	7	0	10
Thickness of body in front of dorsal	4	0	1	1	0	6
Height of posterior part of dorsal	1	9	0	10½	0	6
„ of second spine of dorsal	0	10	0	4	0	2
„ of posterior part of anal	2	0	0	10½	0	6
Length of second anal spine	0	6	0	3½	0	2½
Number of scales above lateral line about middle of body in a space of 3 lines	3		5		8	

The coloring of this fish is so exceedingly variable that it is only those specimens in which the brown mottling is most abundant that the term "Blackfish" seems appropriate, while in many others where the brown spots are larger, much fewer, and more distant, and not extending to the belly, the general tint of the whole fish seems a light yellowish-olive, whitish below. The scales vary in different parts of the body, some having the posterior margin truly cycloid and the lines of growth only slightly waving, while others have the margin so much indented and the lines of growth so much undulated as to make a slight approach to the ctenoid type of scale.

The genus *Gadopsis* is one of the most extraordinary genera of fishes known, as furnishing an intermediate type between the *Acanthopterigious* fishes, in which the anterior rays of the dorsal fin are simple spines, and the scales usually ctenoid, and the *Malacopterigious* fishes, in which all the rays are soft and branched, and the scales usually cycloid: here, the cycloid scales, the general form, the imperfect, filamentous, jugular, ventral fins, and the majority of the characters so nearly agree with the *Malacopterigious* fishes, that all the most recent writers, with Dr. Günther, classify it with the *Anacanthini* (agreeing generally with the *Malacopterigii* of older writers), although the anterior rays of the dorsal and anal fins are distinctly spinous.

As Dr. Richardson states that the head of his *Gadopsis marmoratus* forms one-quarter of the whole length, including the caudal fin, I think it is better to assign a new specific name to the present more slender and smaller-headed fish, which occurs in great abundance in the River Yarra. It is readily caught with a line, and forms an excellent fish for the table.

There is a second species of *Gadopsis* proportionately shorter, deeper, and with a much more convex dorsal outline, abounding in the Bunyip River in Gippsland, to which I have given the name *Gadopsis gibbosus* (McCoy); the difference of outline and proportion easily distinguishing it from the present better known fish; it agrees with Richardson's species in having the head one-fourth of the total length including the caudal, and in the profile rising from the snout to the highest part of the back at base of dorsal with a regular gentle convexity, contrasting with the present species, in which the back scarcely rises from a little behind the eye. *G. gibbosus* has, however, 12 spines in the dorsal, and *G. marmoratus* is said to have only 10.

Explanation of Figures.

Plate 27.—Fig. 2, rather small specimen, natural size, of the light-colored variety, with the few large distant dark marblings not extending on the belly. Fig. 2*a*, one of the scales, magnified twelve diameters, showing the nearly simple posterior margin. Fig. 3, another scale, showing the occasional irregular undulation or notching of the posterior margin. Fig. 2*b*, teeth of upper and lower jaws, palate-bones, and vomer.

Frederick McCoy.

PLATE 28.

SCOMBER PNEUMATOPHORUS (DE LA ROCHE).

THE SOUTHERN MACKEREL.

[Genus SCOMBER (LIN.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygii. Fam. Scomberidæ.)

Gen. Char.—Elongate, fusiform; mouth wide; first dorsal of slender spines, separated by a distinct interval from the second dorsal, which is composed of soft branched rays, with one spine in front; five or six finlets behind the dorsal and anal fins. Scales very small. Teeth small on the jaws, vomer, and palate-bones. Sides of the tail ridged. Branchiostegal rays seven. Air bladder simple or absent. Pyloric appendages very numerous. Cosmopolitan, in temperate and warm seas.]

DESCRIPTION.—*Fins:* 1st dorsal of 12 slender spines; 2nd dorsal of 1 short spine and 11 soft branched rays; anal of one short spine and 12 soft rays; pectoral, 19; ventral, one spinous and 5 soft rays; caudal, 17; 5 finlets behind anal and dorsal fins. *Height:* $5\frac{1}{4}$ to $5\frac{1}{2}$ in total length without caudal fin, or $\frac{1}{6}$th to end of caudal; head $3\frac{3}{4}$ in length of body, or $4\frac{1}{4}$ to end of caudal; diameter of eye about $3\frac{3}{4}$ in length of head. *Color:* back and upper half of sides bluish- and greenish-grey, with about 33 irregular, transverse, flexuous, branching, darker streaks about their own width apart, separating into rounder and more isolated spots along middle of sides, below which there are very numerous close dark-grey dots or freckles, on a whitish-pearly ground, tinged with yellow, purple, and slight pink reflexions; cheek behind eye yellowish; forehead between eyes whitish; fins dark-greyish. Iris silvery and yellowish. A simple slender air bladder. *Scales*: along lateral line, about 200; above lateral line, from front of dorsal fin, 15; below lateral line, under 1st dorsal, about 35. *Teeth:* subequal, slender, arched, about 70 in a single row on upper jaw, and 46 on lower jaw (about 18 in a space of 3 lines); a small oval group of about 7 teeth on each side of front of roof of mouth; a long narrow sigmoid band on each palate-bone.

REFERENCE.—Cuv. and Val., Hist. Nat. Pois., v. 8, p. 36; Tem. Faun. Jap. Pois., t. 47, f. 1.

I cannot find the slightest difference between our Hobson's Bay and Mediterranean specimens on comparison. Steindacher, it will be remembered, believes *S. pneumatophorus* to be the young of *S. colias* (Sitzungsberichte d. Akad. Wissenschaften zu Wien., lvii., p. 353). The speckling of the lower part of the sides and belly is, when alive, like that of the Spanish Mackerel (*S. colias*), but when preserved for some time in spirit these disappear, leaving the belly and lower part of sides plain silvery, as described in the *Scomber Australasicus* of Cuvier and Val., the claims of which to rank as a distinct species seem to me very doubtful. The eyelids leave the middle third of the eye bare. The preoperculum is radiatingly striated, and of yellowish-bronzy tint.

I have not yet met with the Mackerel without a swim-bladder mentioned by some authors from our seas.

The detailed measurements are as under :—

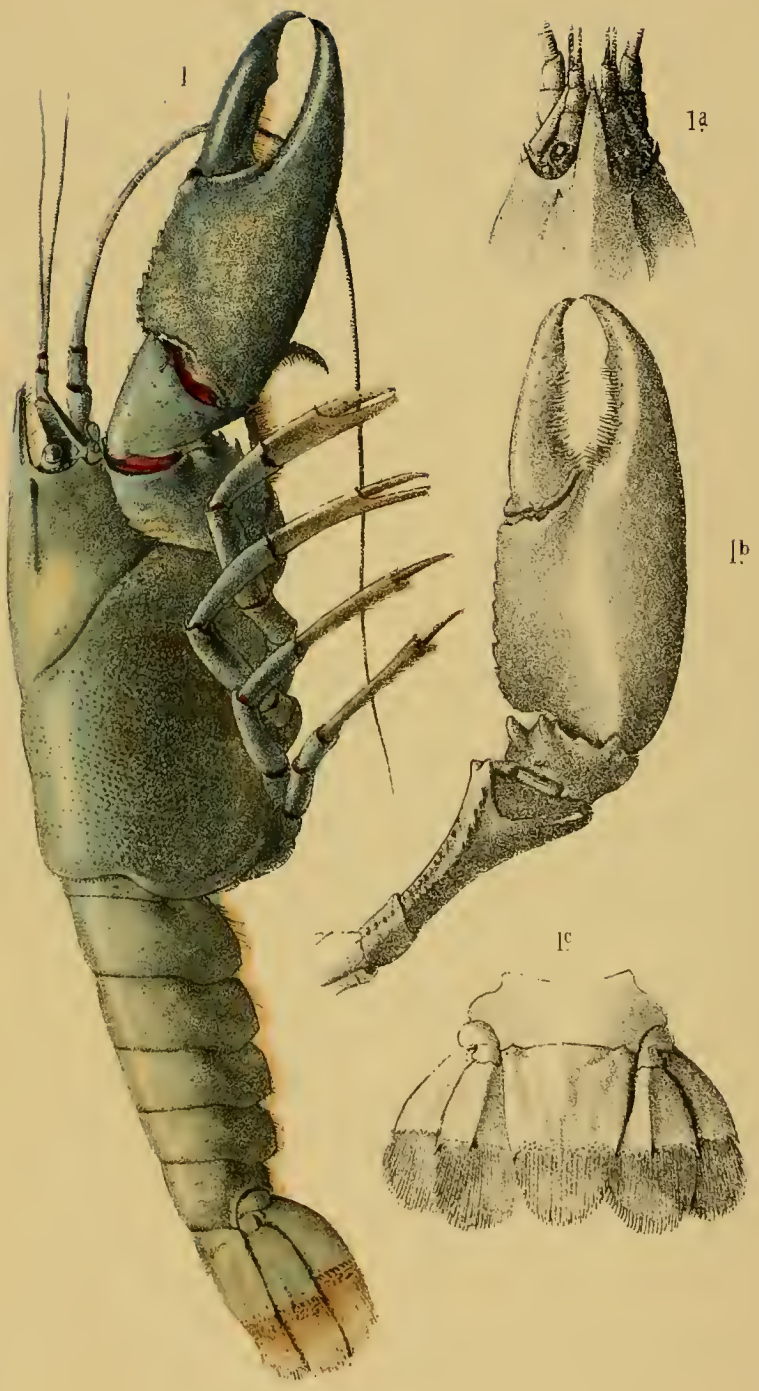
Measurements.	Ins.	lines.
Length from snout to distal end of caudal	9	8
„ of caudal	1	4
„ from snout to anterior edge of orbit	0	10
„ of orbit	0	7
„ of head from snout to end of operculum	2	5
„ from snout to anus (measured along ventral edge) ...	5	5
„ from anus to end of caudal	4	2
„ from snout to base of pectoral	2	4
„ from snout to origin of 1st dorsal	3	1
„ „ „ 2nd dorsal	5	8
„ „ „ ventral fin	2	10
„ of pectoral	1	1½
Height of 1st dorsal	1	1½
„ 2nd dorsal	0	6
Length of anal	0	7½
„ ventral fin	0	10
Width between eyes	0	7
Depth of body in front of dorsal	1	6
Thickness of body in frout of dorsal	1	1

This beautiful fish occurs rarely in Hobson's Bay, generally in the month of June, and in considerable numbers when it does appear.

Explanation of Figures.

Plate 28.—Fig. 1, specimen of usnal coloring when alive, two-thirds of the natural size. Fig. 1*a*, section near tail. Fig. 1*b*, interior of mouth, one-fifth larger than nature, to show the number and arrangement of the teeth. Fig. 1*c*, top of head to show the form of the white forehead. Fig. 1*d*, section in front of dorsal. Fig. 1*e*, some of the teeth magnified. Fig. 1*d*, scale of lateral line, magnified. (The spots on lower part of sides and belly are slightly too large and dark).

Frederick McCoy.



Ludwig Becker, del. & lith. *Prof. M. Coy, direx.* *Hamel & Cº imp.*

PLATE 29.

ASTACOIDES BICARINATUS (GRAY SP.).

THE YABBER CRAYFISH.

[Genus ASTACOIDES (GUÉR.). (Sub-kingd. Articulata. Class Crustacea. Order Decapoda. Section Macrura. Fam. Astacidæ.)

Gen. Char.—General form and character of *Astacus*, but with the first segment of the abdomen destitute of appendices. Abdominal feet membranous, with a row of small calcareous plates on each margin. Outer pair of tail-fins jointed, with the distal portion thinner and less calcareous than the proximal one; inner lobe not distinctly jointed, and calcareous to the end. Fresh waters of Madagascar and Australia].

DESCRIPTION.—Beak acutely pointed, bounded by a narrow, rounded, prominent, smooth ridge on each side, between which the surface is nearly flat, slightly convex behind; apex acutely pointed, with a small tooth on each side, reaching as far forward as the base of the last large joint of the outer antennæ, or slightly behind the base of the last large joint of the inner antennæ, and behind the apex of the large basal scale of outer antennæ. Carapace subcylindrical, moderately convex above and on the sides; two long, narrow, prominent, subparallel ridges extend from the orbits (one on each side), a little outside the base of the rostral marginal ridges, about two-thirds of the way to the nuchal furrow; whole surface of carapace and abdomen destitute of spines or tubercles, but impressed with moderately close, irregular punctures; outer pair of tail-fins with a distinct transverse joint at about two-fifths from the base, separating abruptly the spinulose, serrated, posterior margin of the thick, calcareous, proximal portions from the distal, thin, flexible, semimembranous part; calcareous basal portion of inner pair of fins nearly as long as the membranous part, without joint or serrated division, but having a sharp spine terminating a ridge along the outer edge and another terminating a larger ridge a little on the inner side of the middle; middle flap of the fin with the calcareous portion slightly longer than the thin membranous portion, and having a small spine terminating the lateral margin on each side. Anterior pair of feet or claws nearly equal; the outer edge, and under and upper surfaces of each hand moderately convex and smooth, without spines, the inner edge compressed with a row of about 14 small compressed blunt spines; the fixed and movable finger of each claw round and smooth on the outer edge, with short incurved points, and having the inner edges set with very small, numerous, unequal teeth; carpus smooth above and outside, having one strong spine in middle of inner edge, with one smaller below and in front of it, and one still smaller at base with a few intermediate granules; the next joint of the leg has a compressed slightly-toothed or serrated upper edge (about six scarcely formed or raised teeth), a smooth outer and inner surface with a small spine on each side of carpal joint; lower edge with two rows of very irregular small spinous tubercles. Anterior median process of epistome semicircularly rounded, or very slightly pointed and semielliptical, slightly longer than wide. *Color:* whole body and abdomen dull pale-olive, varying in some to greenish-horn color; membranous part of tail-flaps pale-brown; anterior pair of legs bright-blue, the basal and outer portion of upper surface of hand mottled with scale-shaped spots of dull ochreous-yellow, skin of joints bright-red. Length of small average specimen from snout to tip of tail, 4 inches 7 lines; length of carapace from tip of snout along mid-line of back, 2

inches 1 line; diameter of carapace, 1 inch; length of carpus, 7 lines; length of hand, 1 inch 7 lines; width of hand, 8 lines; length of inner antennæ, 1 inch 4 lines; of outer antennæ, 4 inches.

Reference.—*Astacus bicarinatus* (Gray) in Eyre's Australia, v. 1, p. 491, t. 3, f. 2.

This species grows to six inches in length, from snout to end of tail, and varies considerably in color, some having the body and abdomen dark-olive, others paler or with a yellow tinge, and some are of a dull pale-brown or horn color; the large anterior pair of claws are always blue with red joints, and the flexible part of the five tail-fins dull-brown. The smaller pairs of legs are blue, or greenish, or whitish in different living individuals. These are eaten in great numbers by the aborigines, and by some other people who like them. They are commonly known about Melbourne by the native name of Yabber or Yabbie.

This species does not seem to inhabit the flowing rivers or streams, but is abundant in the quarry-holes and swamps round Melbourne, and in most waterholes in the colony, doing great damage to dams and reservoirs from burrowing holes through the banks. The individuals live for a long time underground in their burrows after the pools of water on the surface have dried up. I can find no difference between the specimens from the swamps of the Murray district on our northern boundary and those near Melbourne.

Explanation of Figures.

Plate 29.—Fig. 1, average specimen, natural size. Fig. 1*a*, rostrum and top of head, viewed from above, showing basal joints of both sorts of antennæ, with the large outer basal scale of external ones. Fig. 1*b*, claw, viewed from the inner side. Fig. 1*c*, tail-flaps, viewed from above.

Frederick McCoy.

1a
2a
2b
3
1
4
5
2
6
7

PLATE 30.

ZEUZERA (EUDOXYLA) EUCALYPTI (BOISD. HERR.-SCHÆF.).

THE WATTLE GOAT-MOTH.

[Genus ZEUZERA (LATR.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Heterocera. Fam. Hepialidæ.)

Gen. Char.—Body stout; abdomen extending much beyond the extended hind wings. *Palpi* short, proboscis nearly obsolete. Legs stout, nearly bare; hind tibiæ with two minute, apical spurs. *Wings* elongate, ovate, narrow; anterior pair pointed, very oblique along exterior border, nearly straight along anterior edge or costa; discal areolet intersected by a forked veinlet; second superior vein forked at half its length; second inferior vein more than twice further from the third than from the first; third a little further from the fourth than from the second. *Antennæ* as long as or shorter than thorax of male, deeply bi- or tri-pectinate on basal half; distal half simple, minutely serrated: antennæ of female simple; ovipositor long.]

DESCRIPTION.—*Male.*—Upper side: back of head and front and sides of thorax greyish-white, from numerous, long, spatulate, white hairs amongst the shorter and more numerous brown ones; triangular middle space of thorax dark-brown, sometimes with a mid-line of grey hairs on hinder half, bordered by a narrow blue-black border, forming a triangular horse-shoe shaped band separating it from the lighter anterior and lateral color. Abdomen dark vandyke-brown, with a large white patch on each side of anterior segment, and the posterior edges of each segment, especially the four anterior ones, fringed with greyish-white spatulate hairs. Anterior wings dark umber-brown, with ferruginous veins, between which is a thick irregular reticulation of black, and a very irregular whitish discal stripe extending to the apex of the wings, of more elongate spatulate scales than the darker parts. Hinder wings of the same rusty-brown ferruginous tint as the veins of the anterior wing, with a thick black reticulation between the veins on the apical half; the basal half with the plain ferruginous tint, with a narrow white outer margin. Under side: head, legs, and anterior part of thorax rich dark-brown; posterior middle part of thorax and the abdomen white; anterior wings of a dull umber-brown, with blackish reticulation between the veins and a whitish posterior margin; hind wing like the anterior in color (destitute of the ferruginous color of the upper side), having the black reticulations more extended towards the base. Length of body, 2 inches 2 lines to 2 inches 3 lines; from tip to tip of expanded wings, 4½ inches to 5 inches 2 lines.

Female.—Larger than the male, with usually the whitish sides of thorax, edges of abdominal segments, and discal stripe less distinct, or more brown; the posterior wings more richly ferruginous in tint, and with less of the black reticulation than in the male. Length of body, 2 inches 3 lines to 3 inches; from tip to tip of expanded wings, 5 inches 3 lines to 7 inches. Ovipositor when exserted more than half the length of the abdomen.

REFERENCE.—Herrich-Schæffer, Lepidop. Exot., fig. 164; Walker, Cat. B. M., Heteroc., p. 1539.

The coloring is very variable, firstly in the richness of the ferruginous tint of the hinder wings, but more particularly in the whitish parts; the whitish stripe along the anterior wings, although

usually more distinct in the male than in the female, is sometimes almost absent or reduced to a small discal spot and a trace of the stripe at the apex of the wing in male specimens. The front and sides of the thorax also vary, for, although usually whitish in the male and brownish in the female, the two sexes are sometimes alike in this respect from the longer spatulate white scales or hairs being more or less abundant; and similarly the edges of the abdominal segments are usually browner or less distinctly margined with white in the female than in the male, but both sexes vary considerably in this respect.

My late friend Mr. Walker, in his Catalogue of the British Museum *Heterocera*, suggests that the *Eudoxyla d'Urvillei* (Herr.-Sch.) is only the female of this species, and I can see no difference in the figure; but as the different locality of Tonga Tabu is given for it, I hesitate to combine the species.

The moths of the family *Hepialidæ* are popularly known as "Swifts" or "Swift-moths," from the great quickness of their direct flight in the dusky twilight. The group is divided into three sections, typified by, 1st, the *Hepialus*, the true Swifts or Ghost-moths; 2nd, by *Cossus*, or the Goat-moths; and, 3rd, by *Zeuzera*, or the Wood-leopard-moths, as they are popularly called, respectively. They all have a complex neuration of the wings, which are deflexed when at rest. The larvæ of all are thick fleshy naked grubs, with a few hairs; they have 6 pectoral, 8 ventral, and 2 anal feet; and have the prothorax protected by a broad horny shield; often spending three years in the larva state. Those of the first group inhabiting subterranean burrows and feeding on the roots of grasses; those of the other two feeding on the interior of the wood of timber trees, to which they prove very destructive from boring great vertical canals, so weakening the tree that it either dies or is blown over. In most forest-bearing countries the natural enemy of these larvæ and protector of the trees from their destructive action is the group of Birds of the family *Picidæ* or Woodpeckers, who by instinct know where the larvæ are, and by the powerful strokes of their suitable bills cut down quickly on the larvæ through the sound wood, and, transfixing the grub with their long worm-like barbed tongue, draw it out, and devour it.

In Australia alone the Woodpeckers have not been provided; and the consequence is that every tree cut up for firewood is seen to be traversed with large cylindrical canals made by these or allied larvæ, which are the greatest destroyers of our forests—so abounding in the wood of almost every forest tree that, in a storm, it is dangerous to go near a large tree, as one apparently sound will snap across unexpectedly with a moderate wind from the number of these larvæ tracks.

The classical reader will remember the praises lavished by the Roman epicures of old on the *Cossus* as a delicacy for the table; being a thick, pink, fleshy caterpillar, as large as a man's finger, extracted from the wood of the Willow trees, and produced by a Goat-moth belonging to this family; it is curious to find that the very similar larvæ of the present insect, abounding in the Wattle trees, or *Acaciæ*, of Australia, are highly prized for food by the natives. When properly cooked, I am told by all bushmen that they are delicious, but circumstances over which I have no control have prevented me from trying them, to test the fact myself.

Considering the great importance attached lately by the Government to the preservation and cultivation of the Wattle or *Acacia* trees, and the great and increasing annual money value of the bark, it is important for bark-strippers and the persons employed by the Government to foster the growth of the Wattles to know the appearance of the insect represented on our plate, as the greatest destroyer of these trees, so that attention may be given to killing the perfect moth; the large abdomen of the female of which is distended with millions of eggs, each of which will produce a voracious grub as thick as the thumb and five or six inches long, eating the timber for years.

It is unfortunate that the specific name *Eucalypti* should have been given to this species, as it never frequents any species of *Eucalyptus* or Gum-tree, but feeds exclusively on the wood of the different species of the *Acacia* or Wattle trees.

The larva, hatched from eggs laid in crevices of bark of the branches, works steadily into the interior of the tree, proceeding head downwards, enlarging the cylindrical burrow as it gradually grows larger and eats its way downwards, often reaching to the

roots. When about to assume the pupa state it forms a slight cylindrical cocoon from four inches to a foot long of silk and saw-dust-like small grains of wood, as a lining to the end of its burrow. When the burrow terminates in a root a few inches below the surface of the ground, the cocoon is continued from the hole in the wood upwards as far as close to the surface of the ground; but when the burrow ends in the surface of the trunk of the tree above the ground level there is no prolongation of the cocoon. In either case the pupa works itself forward by means of the little, deflected, spines on the rings, pushing for half an inch or so through the end of the cocoon before it bursts to allow the imago to escape.

The ovipositor of the females is of extraordinary length and rigidity, equalling half the length of the abdomen when exserted, but capable of being entirely retracted out of sight; with this the eggs are deposited deep in the crevices or fissures of the bark of the trees, on the inner timber of which the larva feeds.

Common in the winged state about February, flying in the twilight, in all parts of the colony where Wattle trees abound.

Explanation of Figures.

Plate 30.—Fig. 1, average specimen of male, natural size; the right-hand pair of wings separated from the body by a narrow space represent the under side. Fig. 1*a*, antennæ of male, magnified to show the bipectination confined to the basal half. Fig. 2, female, natural size, in resting position to show the deflexion of the wings; the antennæ laid back. Fig. 2*a*, one of the antennæ of the female, magnified to show the absence of the pectination on the whole length in that sex. Fig. 2*b*, small portion of female antennæ, further magnified. Fig. 3, posterior end of abdomen of female with the ovipositor exserted. Fig. 4, pupa, natural size, viewed sideways. Fig. 5, cocoon, with anterior part of pupa projecting and burst open as left by the moth on emerging. Fig. 6, young bright carmine stage of growth of the larva, showing the broad, brown speckled, corneous shield on the anterior end, with the larva in the cylindrical burrow which it forms in the wood of the *Acacia*, working as usual downwards. Fig. 7, pale cream-colored nearly half-grown larva, natural size, viewed in profile.

Frederick McCoy.

By Authority: John Ferres, Government Printer.

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PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

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DECADE IV.

BY

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HONORARY FELLOW OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY; HONORARY ACTIVE MEMBER OF THE IMPERIAL SOCIETY OF NATURALISTS OF MOSCOW; CORRESPONDING MEMBER OF THE ZOOLOGICAL SOCIETY OF LONDON; HONORARY MEMBER OF SEVERAL OTHER SCIENTIFIC SOCIETIES, ETC.
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PREFACE.

It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works descriptive of them, on the plan of those issued by the Governments of the different States of America, investigations were undertaken, by order of the Victorian Government, to determine the Geology, Botany, and Zoology of the Colony, to form collections illustrative of each for the public use, and to make the necessary preparations for such systematic publications on the subject as might be useful and interesting to the general public, and contribute to the advancement of science.

As the geological and botanical investigations have already approached completion, and their publication is far advanced, it has been decided to now commence the publication of the third branch completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades or numbers of ten plates, each with its complete descriptive letterpress, will be published, of

such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This fourth Decade gives illustrations in the first plate and in the text of the Eared Fur-Seal, or Sea-Bear, of the Victorian coasts, of sufficient fullness to set at rest the question of its specific distinction from the nearly allied New Zealand one.

The second plate represents for the first time a small, new, pretty, poisonous snake of the rare genus *Furina*.

The third plate shows the colors of the fresh state of a rare species of *Sebastes*, popularly known as the Banded Red Gurnet-Perch.

The fourth plate figures another of the few fishes of our bay unmistakably identical with an English species, namely, the Angel-fish or Angel-Shark.

The four following plates are devoted to careful illustrations of the twenty-nine species of *Lepralia*, found in Hobson's Bay, of which only six have been figured before.

The ninth plate illustrates our five species *Crisia*, only two of which had been previously figured.

The tenth plate shows the dwelling cases, larvæ, pupæ, and adult states of two species of those most abnormal and curious of all Lepidopterous Insects, the so-called Case-Moths, or House-builder Moths, which in habits, and in structure of the female, differ completely from any other *Lepidoptera*. The more abundant of the two, the case of which is found in numbers on nearly every tree in the colony, has not been figured before in the adult state.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

1st October 1879.

1
1b
1a
1c
1d
1e

PLATE 31.

EUOTARIA CINEREA (PÉRON SP.).

AUSTRALIAN SEA-BEAR OR FUR-SEAL.

[Genus EUOTARIA (GRAY). (Sub-kingd. Vertebrata. Class Mammalia. Order Feræ. Section Pinuipedia. Fam. Phocidæ. Sub-fam. Otarinæ.)

Gen. Char.—Incisors, $\frac{3-3}{2-2}$; upper outer ones very large, like canines; four middle ones small and with cutting edges doubled by a transverse groove; lower ones small, subequal, simple. Canines, $\frac{1-1}{1-1}$; large, conic. Molars, $\frac{6-6}{5-5}$; triangular, pointed, compressed, with a small cusp at base, behind or before, or both; sixth or hind molar entirely behind the hind margin of front of zygomatic arch, with anterior branch of fang arched, diverging to front; the fangs of fourth and fifth imperfectly divided by a sulcus. Skull depressed; of males, broad with the occipital portion elevated and becoming crested with age; that of females narrower, not so elevated behind, and with little or no occipital crest; palate extending to middle of zygoma. Head blunt. Anterior limbs falcate with 4 or 5 rudimentary nails; hind limbs bent forwards when resting or walking, with long nails on three middle toes and very small ones on the two outer toes. Body tapering, tail short. Males larger and with proportionately larger limbs than the females. Hair rather coarse, with scanty or no under-fur at base.]

DESCRIPTION.—Head, viewed from above, semi-oval, slightly pointed at the snout; profile descending with a slight convexity from the occiput to the tip of the snout, from whence the surface bends abruptly inwards and downwards at an angle of about 80° to the lower lip; tip of nose naked, jet black, with a deep median sulcus dividing the valvular nostrils, which converge at an acute angle below and are bounded externally by the fur, and internally and above by the naked part of the nose. Whiskers of about 35 strong flat bristles, blackish towards the base, whitish towards the apex; reaching, in the adult, a little beyond the ear; shorter in the young. Anterior limbs with a distinct lobe of the naked skin at the end of each of the five fingers, with a nearly straight or slightly convex edge between the lobes; the fur extends only as far as the tips of the phalanges, the first four of which have distinct but very small rudimentary nails near the posterior margin; a narrow bare portion extends along the anterior edge as far as opposite the end of the fifth phalanx. Posterior limb with the external lobe of the naked skin of margin very slightly longer than the internal one; the three middle lobes of the same length but much narrower; the nails of the three middle phalanges very large, the middle one longest, the first and fifth very much smaller, the first, or external one, smallest; naked margins of both pairs of limbs and naked part of snout jet black.

Outline showing positions of the limbs in the Eared Seals on land.

Male: length of adult, about 7 feet. *Color:* of adult, greyish dark-brown, somewhat lighter on the sides and snout, of a darker rich chesnut hue on the belly, tail, limbs, and edge of upper lip, the hind limbs darkest; under-fur scanty, of a rich

rusty chestnut; the hairs blackish at base, lighter, and browner or yellowish towards apex; ears dark-brown, black within. *Young:* blackish, darker brown (black when wet) than the adult above, yellowish about the muzzle, cheeks, and throat, rich rusty chocolate below, the under-fur of the same dull, rusty coffee-color in all parts.

Female: Length of adult (A), about 5½ feet. *Color:* yellowish ashy-grey above and on the sides, brownish on the snout, upper lip lighter; all below dark rich chestnut-brown from the base of pectoral to the tail; the anterior part of the breast and throat of the same light-grey as the upper surface; upper and lower surface of fins rich chestnut-brown, darkest below; hairs with a longer yellowish or greyish apical portion giving the iron-grey general tint with yellowish hue in some lights, the base of each hair being dark, as in the male, and with the same scant, rusty, coffee-color under-fur. *Young:* blackish-brown above, yellowish-white on throat, belly, and behind pectoral.

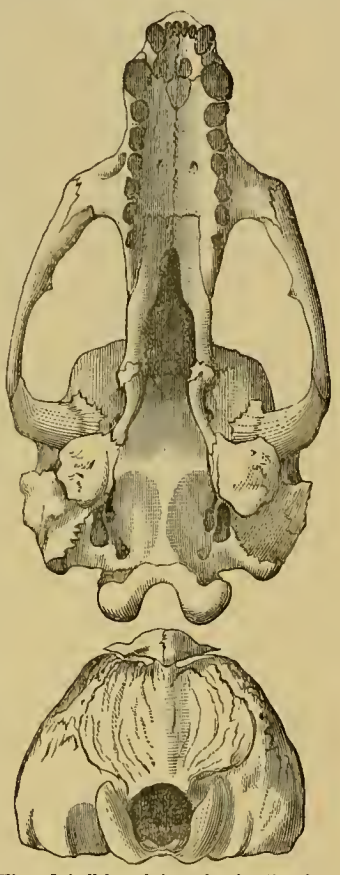
Measurements of Specimens in Museum.

	Adult Female. (A)	Adult Male. (B)	Adult Male. (C)	Young. Male. (D)	Young. Fem. (E)
	ft. ins.	ft. ins.	ft. ins.	ft. ins.	ft. ins.
Length from tip of snout to extremity of tail ...	5 6	7 2½	5 9¾	3 0½	2 5¾
„ from tip of snout to edge of lip ...	...	...	0 2	...	...
„ from tip of snout to occiput	0 10	1 1¼	0 10½	0 6½	0 6
„ from tip of snout to front of pectoral	2 4	2 7	2 1	1 1	0 10¾
„ between eyes across forehead ...	0 4	0 5¼	0 4½	0 3	0 2¼
„ from tip of snout to eye	0 4	0 5	0 4⅓	0 2¾	0 2⅛
„ from tip of snout to ear	0 8	0 9	0 8¼	0 5¾	0 5
„ of pectoral	1 4	2 0	1 6¾	0 10	0 8
„ of ear	0 1½	0 1½	0 1¼	0 1¼	0 1
„ of tail	0 2½	0 4	0 2½	0 1¾	0 1¼
„ of hind fin	0 11½	1 2¼	1 1½	0 8½	0 6
Greatest width of hind fin	0 9	0 10¾	0 7	0 5	0 5
Whiskers	0 6½	0 5½	0 5¼	0 2¾	0 2

	ins.	lines.
Length of outer lobe beyond origin of nail	3	10
Length of second lobe from origin of nail	3	10
„ of third lobe from origin of nail	3	9
„ of fourth lobe from origin of nail	3	8
„ of fifth lobe from origin of nail	3	3
„ of inner nail	0	3
„ of fourth nail	0	9
„ of middle nail	0	11
„ of second nail	0	10
„ of first or outer nail ...	0	2½

Skull of male [specimen in table of measurements marked (C)]:—length from tip of snout to posterior edge of condyle, 10 inches; greatest width across zygomatic arches, 5 inches 6 lines; greatest height from basioccipital to slightly marked occipital crest, 3 inches 6 lines; crest scarcely marked; parietal sides of the skull moderately convex; from tip of snout to anterior edge of orbit, 3 inches; breadth from tip to tip of postorbital processes, 2 inches 2 lines; space between the orbits convex above, 1 inch 3 lines wide at narrowest posterior portion; length of lower jaw to middle of condyle, 6 inches 10 lines; greatest depth vertically under second molar, 1 inch 5 lines; depth behind fourth molar, 1 inch 1 line. *Teeth:* length of molar series of 6 teeth in upper jaw, 2 inches 4 lines; anterior molar with a middle cusp, conical, compressed, 5 lines long; with a distinct cusp at the base in front, and one slightly smaller behind; a rough, distinct, crenulated cingulum at base of crown connecting the cusps

on the inner side, with a very faint indication on the outer side of base; second molar slightly larger than the first, with the cusps at base more strongly developed; the anterior one somewhat larger and diverging more from the crown than the posterior one; third molar a little larger, with the cusps still more developed; fourth nearly resembling the third; fifth directed obliquely backwards with the cusps nearly equal; sixth, or hindermost, molar directed obliquely backwards and downwards, with the cusps scarcely marked, being nearly obsolete behind and before; the space between the fifth and sixth molar is much greater than that between the others; canine, 11 lines long, $6\frac{1}{2}$ lines wide at base, interval between it and the canine-like outer incisor, 3 lines; conical canine-like outer incisor, 6 lines long, 3 lines wide at base; inner notched incisors, 2 lines long; the 6 incisors occupying a space of 1 inch 2 lines. The last upper molar has a long anterior fang abruptly arched forward from the end of the shorter straight hind fang; the roots of the other molars only divided by a shallow groove; 5 molars in lower jaw, each with the anterior and posterior cusps well-marked, occupying a space of 1 inch 10 lines; lower canine, 1 inch 1 line long, 7 lines wide at base. Palate hollowed in front, becoming flattened behind, bordered externally by two blunt rounded ridges, extending to the outward curved hamuli of the pterygoid bone; shape of notch in posterior edge of palate bone variable, being in the male (marked C above) semi-elliptically curved, the vacancy being 1 inch wide at posterior junction of the palate with the pterygoid, and extending 1 inch 4 lines forward, or a little behind the line of the orbital process of the zygoma; while in the female (marked A above) it extends forward at an acute angle as far as a line across middle of sixth molars, and is much narrowed abruptly in the anterior half of the notch, in front of the point where the shorter and wider notch of the other skull described ends. (*See* wood-cut.) In the latter skull the hamuli of the pterygoid bone are not produced at juncture with palate bone.



View of skull from below, showing the elongate form of the hind edge of palate in one skull, and the shorter rounded form (indicated by white dotted outline) in another, agreeing in all other respects. The lower figure is a view of same skull from behind, showing little or no crest behind and the convexity between the eyes in front.

Reference.—*Otaria cinerea*, Péron, Voy. aux Ter. Aust. 2, 77; Quoy and Gaimard, Zool. du Voy. de l'Astrolabe, Mam. t. 12, t. 13, t. 15, figs. 1 and 2; Gray, Hand List of Seals, &c., t. 26.

The Eared Seals, or Sea-Bears as they are called, inhabiting the coasts of Australasia present very great difficulties in their determination, from the imperfection of the descriptions and definitions of various writers, and from the uncertainty often arising as to which species, defined by the skins, agreed with species defined by the

characters of the skulls. The group generally, forming the sub-family *Otarinæ*, is easily distinguished by the remarkable appearance of subcylindrical, small, external ears; and the genera *Otaria*, and *Arctocephalus*, differing by the varying length of the palate, have been proposed for them long ago by Dr. Gray, with some other subdivisions, as *Neophoca*, *Zalophus*, *Gypsophoca*, *Euotaria*, &c., recognisable as subgenera. These Sea-Bears differ also from the true Seals in the forward direction of the hind limbs when at rest; and in their raising themselves clear of the ground on them and on the outward-turned anterior limbs when walking on land, which they do with comparative ease. The females go far inland to bring forth their young, who run after visitors, snapping at their legs and barking like dogs—according to the accounts of persons who have landed on the islands frequented by them in the breeding season. The unwilling young are taught to swim when well-grown by the female.

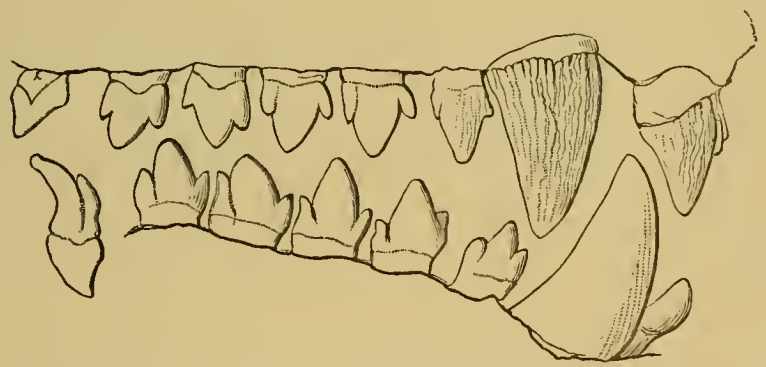
I adopt here the view of Mr. J. W. Clark (P. Z. S., Dec. 1875) after careful investigation, that the common New Zealand species is properly the *Otaria Forsteri* of Lesson; and although on Flinders' authority he quotes this species from Bass' Straits I have not seen it, and doubt its occurrence there. I also agree with Mr. Clark in confining the specific name, *O. cinerea* (Péron), to the species figured by Quoy and Gaimard in the voyage of the "*Astrolabe*," found by them at Western Port, with distinct anterior and posterior cusps to all the grinders, except the sixth upper molar, in which latter tooth the cusps are scarcely perceptible. These figures, however, are so inaccurate that if the skull and skin figured were not still in the Paris Museum it would be impossible to be certain that they really represented the species.

The naked portion of the snout in our Victorian species is only, in the large male (marked c above), about $1\frac{1}{4}$ inch long, and 1 inch 1 line in greatest width, so that it is much smaller than the corresponding part in the New Zealand species (*O. Forsteri*) of the same size, and the nostrils do not suddenly bend outwards in the upper half, as in that species, but simply converge each in a nearly straight line from the upper to the lower ends in a V-shaped pattern.

The Hon. David Moore has kindly furnished me with a great deal of valuable information respecting the old trade at Sydney in the Fur-Seals of this species. The males he mentions were more valuable than the others; these were entered in the invoices under the trade term of "Wigs," the females being entered as "Klap-matches," and the young as "Pups." The trade, he informs me, has now entirely ceased in New South Wales, Victoria, and South Australia, partly from the animals being scared away by the traffic of a multitude of steamers and other vessels, and partly from the greater scarcity of labor no longer leaving it profitable to pay a sufficiently numerous crew of a vessel to man the several boats required. Colonel Champ also informs me that five-and-twenty years ago he used to see several of the islands between the Tasmanian and Victorian shores covered with numbers of these Fur-Seals, of which it is a rare circumstance to see a single individual now in the localities where they were so common formerly.

I subjoin in foot-note an amusing notice of one of the young specimens now in the Museum, written by the late clever observer and artist, Ludwig Becker.*

To render the comparison of the New Zealand *Otaria* with our Victorian species easy, I give here carefully-drawn wood-cuts of the teeth of *E. cinerea*, natural size, showing distinct anterior and



Side view of upper and lower teeth, natural size, viewed from the outside. The separate tooth is the last upper molar, viewed from inner side, showing the arched divided fang.

* "Professor McCoy. University, 24th January 1859.—Young female Seal, caught alive, *vis-a-vis* Wilhelmi's residence (Punt road, not far off from Gardiner's Creek road, south), sitting under a tree, early in the morning yesterday week; it was lively and galloped alongside Wilhelmi, who was leading it home with a rope. The nearest point of the Yarra is distant say

posterior cusps to them all except the last upper one, in which they are indistinct ; and I also give wood-cuts of the anterior and posterior limbs, to show the difference of the lobes and nails when compared with Mr. Clark's figure of *O. Forsteri* in his paper above referred to—in ours the lobes between the fingers of the pectoral not being marked, and the three middle lobes of the hind limb being as long as the external ones—presenting thus obvious differences.

Anterior and posterior fins, about 1-5th natural size.

All the specimens described above were killed at the Heads, near Queenscliff.

EXPLANATION OF FIGURES.

PLATE 31.—Fig 1, profile in swimming position. Fig. 1*a*, profile of skull 1-6th natural size. Fig. 1*b*, front view of ditto, showing the great, canine-like, outer, upper incisor teeth. Fig. 1*c*, half of palate and teeth, ½ natural size. Fig. 1*d*, ditto lower jaw. Fig. 1*e*, one of the molars, natural size.

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half-a-mile. It lived three hours after it was caught. If you will buy it, I think it would be the means of completing your observations on Seals.—Yours truly (signed) LUDWIG BECKER.

"Length, from end of tail to tip of nose, 2 feet 5 inches. *Color:* the back of head, back and under side of feet, and the whole back, of a brownish-black ; the hair on the roots whitish ; belly brown ; eyes dark-blue. Forearms in the middle of whole body. Head large in proportion to the length of the animal. I see some difference in the form and setting of the nails from the one I already lithographed. There are also differences in the dental system ; but I think this and the peculiar shortness of body, the color of fur, &c., &c., to be the result of the specimen being a young one. I think it is worth to be bought for the Museum, it being fresh enough for proper setting ; but haste must be made with, otherwise the hot weather will spoil it. Wilhelmi skinned it already. I believe the specimen is fully worth the price paid for the old one.—L. B."

FREDERICK MCCOY.

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PLATE 32.

FURINA BICUCULLATA (McCOY).

THE TWO-HOODED FURINA-SNAKE.

[Genus FURINA (DUM. & BIB.). (Sub-kingd. Vertebrata. Class Reptilia. Order Ophidia. Family Elapsidæ.)

Gen. Char.—Body slender, cylindrical, of nearly the same diameter from the small head to base of tail, which is rather short, conical, pointed. Two rows of subcaudal plates. Scales small, uniform, smooth, in 15 or 17 rows. A row of teeth on the upper jaw behind the small anteriorly grooved fang. Rostral shield large, rounded; frontals subequal; vertex plate nearly or quite reaching the anterior ocular; no loreal, replaced by nasal, posterior frontal and ocular; one nasal pierced by nostril; one anterior and two posterior oculars. Australia.]

DESCRIPTION.—*Form:* body slender, cylindrical; head wider than neck but only a little wider than middle of body, ovate, moderately narrowed and rounded in front, broader behind, flattened above; tail small, slender. *Scales:* 17 rows of scales across middle of back, rhombic, smooth; ventral scales, 180 to 210; subcaudals, 64 to 66 pairs; anal scale double. *Plates:* rostral shield moderately large, forming the rounded projection of the muzzle, obtuse-angled behind between the anterior half of the anterior frontals; anterior frontals small, about one-third wider than long; posterior frontals about twice the length of the anterior ones; vertex plate about one-third longer than the two sets of frontals taken together, twice as long as wide, obscurely hexagonal, very obtuse-angled in front, not reaching the large anterior ocular, sides parallel, acute-angled behind; parietal and occipital shields moderately large. *Color:* color of back and sides of body and tail hazel-brown (with, in figured specimen, about 20 narrow transverse black bands on about the middle third of the body, each band about 1 scale wide and separated from the next by intervals varying from 10 to 13 scales; few of the bands go quite across the back and sides, most of them extending little more than half way from one side to the other, the imperfect bands alternately on the right and left sides); a large black patch occupies the top of the head from the posterior ends of the posterior frontals to the posterior ends of the occipital plates, encircling the eye and reaching half across the fourth labial plate in front, and obliquely from the upper post-ocular to the corner of the mouth behind, the transverse posterior edge followed by a narrow band of bright reddish cinnamon, a paler tint of the same color occupying the side and front of the head, including the rostral, both frontals, anterior and posterior oculars, temporal and upper labial plates; immediately behind the narrow reddish collar is a second large black patch a little less long than the anterior one, behind this the brown of the back is much lighter for a space of 4 or 5 scales wide; underlip and throat bluish-white; scales of belly pale-yellowish, each with two to four square, dull rusty orange patches as far as vent; eyes black with a yellow line round the circular pupil. *Teeth:* about 12 small, solid teeth behind each fang, and a row of about 20 slightly larger, on each palate bone. Length, 12 inches, of which the tail forms 2 inches; greatest width of body, 4 lines; length of gape, 5 lines.

This rare and beautiful little snake is a clear example of the genus *Furina*, distinguished from *Diemenia** by there being only a single nasal plate pierced by the small nostril, instead of two with the nostril between them. Although technically a poisonous snake, it is too small to be dangerous. In the two large black patches on the head and nape, separated by the narrow transverse light band, this new species resembles the *Furina bimaculata* (Dum. & Bib.), but differs in the proportions of the head plates, in the greater number of rows of scales on the back and in the greater number of the subcaudal scales.

No other Australian snake has the middle of the body marked with narrow distant black bands, often imperfect, on alternate sides like the example figured, but three other specimens of the same size are without them.

The genus *Cacophis* of Günther does not seem clearly distinguished from the older *Furina*, as Steindacher seems also to think. None of the described species of *Cacophis* have any approach to the large number of pairs of subcaudal plates of the present snake. The specimen figured was found in a torpid state under a piece of bark in July at Longwood, by Mr. Henry Tubb, who presented it to the Museum collection ; it has 202 ventral scales and 64 subcaudals, all divided. A second specimen, 12 inches long, of which the tail formed 2 inches, found in September, was presented by Dr. McCrea ; it has no bands on body and the spots on ventral scales are greyish ; it has 180 ventral scales, and of the 64 subcaudal plates the first seven are undivided ; in all other respects agreeing exactly with the figured specimen. A third example in the collection is 12½ inches long, of which the tail is slightly over 2 inches ; it is without bands on the body, and the abdominal spots are very faint ; it has 210 ventral scales, 66 subcaudal scales, of which the first 4 are undivided ; in all other respects agreeing exactly with the one figured. The number of rows of dorsal scales is the same in all. Being found in the winter and early spring

* In *Diemenia superciliosa*, the common brown snake, the nostril is so large as almost to reach the edge above and below, so that it is often difficult to say whether there are one or two nasals in that species ; in some specimens in the Museum there are clearly two nasal plates.

months our specimens are no doubt of the average adult size. All our examples are from the Murray district.

The following table gives the numbers of scales and measurements of six specimens in the National Museum collection :—

Specimens.	Scales of Back.		Plates.		Length.	
	Across Middle.	Over Base of Tail.	Abdomen.	Tail.	Total.	Tail.
					ins.	ins.
1. Semi-banded specimen from Longwood ...	17	16	202	64–64	12	2
2. Unbanded, from Benalla	17	15	196	64–64*	12	2
3. Unbanded	17	15	198	62–62†	11	$1\frac{7}{8}$
4. Unbanded	17	15	203	63–63	11	$1\frac{3}{4}$
5. Unbanded	17	14	209	64–64	11	2
6. Unbanded	17	14	210	66–66‡	$12\frac{1}{2}$	2

* First seven undivided. † Third one undivided. ‡ Four first undivided.

Explanation of Figures.

Plate 32.—Fig. 1, view from above, natural size. Fig. 1*a*, side view of head, twice the natural size, to show the disposition of the colors. Fig. 1*b*, view of head and part of body from above, twice the natural size, to show the disposition of the color on the head and the black bands on body. Fig. 1*c*, under view, similarly enlarged, to show the coloring of under surface. Fig. 1*d*, outline of plates of head, from above, magnified four diameters. Fig. 1*e*, outline of plates of side view of head, four times the natural size. Fig. 1*f*, inner view of palate with rows of teeth, magnified four diameters. Fig. 1*g*, under side of tail to show the number of double rows of subcaudal plates, twice the natural size. Fig. 1*h*, a few of the abdominal plates, the divided anal plate, and a few pairs of subcaudal plates, four times the natural size.

Frederick McCoy.

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FISH

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PLATE 33.

SEBASTES PERCOIDES (SOLANDER SP.).

THE BANDED RED GURNET-PERCH.

[Genus SEBASTES (CUV.). (Sub-kingd. Vertebrata. Class Pisces. Order Acanthopterygia. Fam. Triglidæ. Sub-fam. Scorpæninæ.)

Gen. Char.—Ovate, compressed; head scaly on all the pieces to or beyond the orbits; no occipital groove; usually a few small spines on each side of top of head. Preoperculum armed with spines. Scales moderate; no skinny appendages on head or sides. Fins—one dorsal, the spinous portion of 12 or 13 rays separated by a notch from the soft branched rays; anal fin with three spines; pectoral moderate, rounded, with the rays of the lower half simple. Strong villiform teeth on the jaws, palatines, and vomer. Seven branchiostegals. Air-bladder generally present. Pyloric appendages few or moderate. All seas.]

DESCRIPTION.—*Form:* ovate, moderately elongate and compressed, profile of head moderately convex, lower jaw ascending when the mouth is shut, with a conspicuous knob under its symphysis forming then the anterior extremity of the head; greatest depth, between third and fourth spines of dorsal, about three and a half times in the total length, including the caudal fin; thickness of the body rather more than half the depth; length of the head slightly more than the depth of the body; curves of the back and belly nearly equal, that of the back blending gradually with the profile of the head. Orbit large, slightly more than one-fourth the length of the head, and slightly less than its own diameter from tip of snout, and its own diameter from base of suprascapular spine; space between orbits about half the vertical diameter of the eye. One strong recumbent spine just over nostril, one strong spine on nasal bone, one somewhat larger on upper front edge of orbit; middle of superciliary ridge smooth but continued with a row of 5 gradually increasing decumbent spines extending with slight divergence to back of head. The preorbital bone has two, broad, triangular spines on its lower edge, the anterior one more obtuse and flattened than the posterior. The preoperculum has 5 strong spines on its hind edge, the second from the top largest; below the edge of each is a deep pit in the edge of the bone. Two spines on the hind edge of the operculum, above and in front of which are two small, triangular, suprascapular spines. Upper edge of dorsal moderately arched, the first spine smallest and directed forwards, the third spine longest, the others decreasing gradually to the eleventh, the twelfth spine about as long as the ninth; the soft dorsal rises to about the height of the tallest spine. Seven lower rays of pectoral, thick and unbranched, projecting far beyond the membrane; border of fin slightly convex posteriorly. *Rays:* branchiostegal, 7; dorsal, 12 spinous and 13 branched; pectoral, 13; ventral, 6; anal, 3 spinous and 5 branched; caudal, 18. *Scales:* above and below lateral line in vertical series, $\frac{8 \text{ to } 12}{24 \text{ to } 22}$; along lateral line, 52 to 55. *Color:* variable; cheeks, sides, tail, and upper part of the body orange, scarlet or vermilion, and carmine-red, dotted or minutely spotted with blackish-brown, rendering the top of the head and middle of the back darkest; one or two broad vertical bands from the third to the ninth dorsal spine extend downwards three-quarters of the depth of the midline of belly; another similar band, the width of the base of the soft dorsal, extends quite across to the middle of the base of the anal; a third band crosses posterior end of body at base of caudal fin; these bands are formed by a confluence of the more numerous blackish freckles of the upper part of the body, a few of which are also scattered

between the vertical bands. All the fins are of a vermilion tinged with orange on the rays; the membrane of the dorsal, caudal, and pectoral being pale-purplish; the dorsal being strongly speckled with black at its base, especially over the transverse dark bands of the body; the membranes of the ventral and anal fins are orange; in front of the pectoral and along the lower part of the sides is a yellow-ochre tint separating the red of the upper part from the pearly white of the throat and belly.

REFERENCE.—*Scorpæna percoides*, Solander MSS. = *Sebastes percoides*, Richardson, Voy. Er. and Ter., t. 15, f. 1 and 2.

The following are the dimensions of the specimen figured:—

Measurements.	Ins.	lines.
Length from snout to distal end of caudal	12	0
„ of caudal	2	0
„ from snout to anterior edge of orbit	0	11
„ of orbit	0	11
„ of head from snout to end of operculum	3	9
„ from snout to anus, measured along ventral edge ...	6	3
„ from snout to base of pectoral	3	6
„ from snout to origin of dorsal	3	3
„ of pectoral	2	5
„ of dorsal	6	0
„ of anal	1	3
„ of ventral, longest ray	2	0
Width between eyes	0	6
Depth of body under 3rd dorsal	3	7
Thickness of body under 3rd dorsal	2	5
Height of 3rd and 4th dorsal rays	1	7
„ of 1st dorsal spine	0	7
„ of 11th dorsal spine...	0	8
„ of 12th dorsal spine	0	11
„ of soft dorsal	1	4
Depth of anal	1	5
Length of 1st anal spine	0	5
„ of 2nd anal spine	1	0

Number of scales (above lateral line about middle of body) in a space of 6 lines, 5.

The fishes of this genus (*Sebastes*) resemble *Scorpæna*, but are distinguished by the scaly covering of all the plates of the head up to the front edge of the orbit, and by the absence of the fleshy or skinny filaments to the head and sides of the body found in that genus.

The present species is popularly called "Gurnet," or "Gurnet-perch," by the fishermen and dealers, as well as the more common *Neosebastes scorpænoides* and *N. pandus*.

It has not been figured with the colors of life before.

Rather rare on the Victorian coast.

EXPLANATION OF FIGURES.

PLATE 33.—Fig. 1, side view, natural colors, reduced. Fig. 1*a*, form of section of body. Fig. 1*b*, interior of mouth, showing the teeth, natural size. (Figs. 1*a* and 1*b* have been lithographed with the dorsal side downwards by the lithographer.)

FREDERICK McCOY.

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PLATE 34.

RHINA SQUATINA (LIN. SP.).

THE ANGEL-FISH.

[Genus RHINA (KLEIN) = SQUATINA (DUM.). (Sub-kingd. Vertebrata. Class Pisces. Order Chondropterygii. Sub-order Plagiostomata. Fam. Rhinidæ.)

Gen. Char.—Body depressed, wide; head semicircularly rounded, with the mouth at the anterior end; pectorals very large, rhombic, fleshy, extended in the plane of the body, with the anterior part of the base extended forward as far as the head, but not united to it; gill-openings five, wide, situated on the side of the neck in the notch formed by the extension of the pectorals; eyes small, covered over with the skin of the body, except a small elliptical slit for the pupil, on the upper side of head; with the spiracles larger, wide, situated behind the eyes, while the nostrils are nearly in the same line on the front edge of the mouth, having some lobed, skinny appendages over each; teeth conical, pointed, small, triangular, without denticles, moderately notched at base with a downward lobe in the middle, no middle tooth above or below, rather distant, similar in the two jaws; tail rounded at base, keeled on the sides near the end, which runs into the lower instead of the upper end of the tail; two small separated dorsal fins on the tail; no anal fin; lower lobe of the caudal fin longer than the upper; ventral fins large, fleshy, and extended laterally like the pectorals; males with small claspers, surface of the skin rough, with minute, conical points directed backwards.]

DESCRIPTION.—As there is only one species, the form is indicated in the generic character. *Color:* above sandy-brownish lilac, the ground color being darker, minutely mottled with very numerous, small, lighter spots, the spots on the fins and eyes being darker; pinkish-white below. *Dimensions:* usually under 4 feet long; length of figured specimen, 3 feet 8½ inches; width across the pectorals, 2 feet; width across the ventrals, 1 foot 3 inches; from tip of snout to first dorsal, 2 feet 5 inches; length of first dorsal, 1 inch 6 lines; height of ditto, 3 inches 6 lines; space between the dorsals, 3 inches; length of base of second dorsal, 1 inch 9 lines; height of ditto, 3 inches; length and width of large teeth, 2 lines; width of mouth, 4 inches 2 lines; length of eye, 6 lines; distance from nostril at anterior edge of snout, 1 inch 5 lines; distance between eye and spiracle, 9 lines. The small tubercular spines are a little larger on the back than on the sides, and in some specimens there is an indistinct median line of still larger ones extending a variable distance from the first dorsal fin towards the head, and usually a few spines in front of and behind the eyes are larger than the others. Number of lobes to the fringed skinny flaps near the nostril varying in each individual.

REFERENCE.—*Squalus squatina* (Lin.), Syst. Nat., 12 ed., p. 398; Shaw, Nat. Miscel., t. 906.

If sailors be good judges of the matter, this fish must be very like an angel, for the Italian fishermen call it "Angelo," the French "Squale ange," and the English-speaking seamen in Britain and America call it commonly "Angel-fish" or "Angel-shark." If the likeness exists at all, it must be quite as strong in our Victorian specimens, of which I have had five or six preserved for the Museum collection, all caught in Hobson's Bay, and clearly identical with

the common English examples of the species ; although, with its small power of swimming, and habit of keeping on the bottom, it is difficult to see how it could pass over so great a space, unless indeed, like some few dog-fish brought up by the dredgers in the "*Challenger*," it may have kept at the bottom all the way. It is a very voracious creature, all our specimens being full of various bottom-keeping fish, as well as Gasteropodous shells. The mid-line of tubercular spines on the back is entirely absent in some of our specimens, partially marked in others, and recognisable in another. The color varies a little, some of the specimens being brown, and others more greenish than the usual color mentioned above. The complexity of the branching, lobing, or fringing of the skinny flaps at the nostrils varies so much that I think Müller and Henle, and Duméril have attached too much importance to this structure in making it a character for founding distinct species. The skin was formerly used in Europe for polishing wood and ivory work.

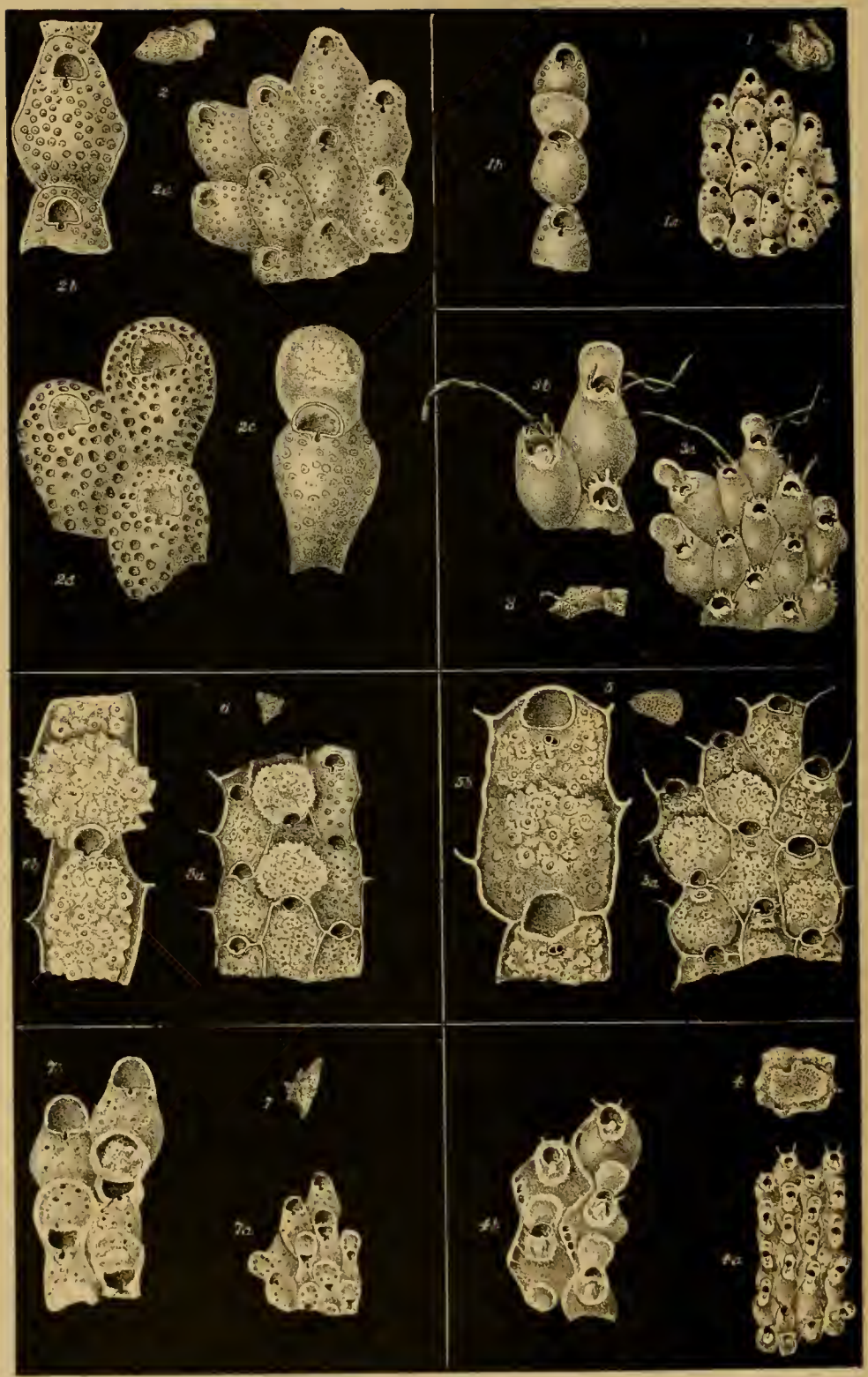
Not very uncommon in Hobson's Bay and round our coast ; sometimes reaching 5 feet in length, though most of the specimens are under 4 feet.

EXPLANATION OF FIGURES.

PLATE 34.—Fig. 1, specimen, greatly reduced, seen from above. Fig. 1*a*, outline profile, viewed from the side. Fig. 1*b*, mouth, viewed from the front, showing the position and form of the eyes, nostrils, fimbriated skinny flaps or appendages, rows of teeth, and tongue. Fig. 1*c*, upper tooth, natural size. Fig. 1*d*, lower tooth, natural size. Fig. 1*e*, eye, nearly covered with the ordinary spotted skin, having the pupil visible through a small slit. Fig. 1*f*, tubercles on sides of head, magnified. Fig. 1*g*, tubercles of side of pectoral, natural size. Fig. 1*h*, tuberculation of sides of ventrals, natural size. Fig. 1*i*, tuberculation of back, magnified.

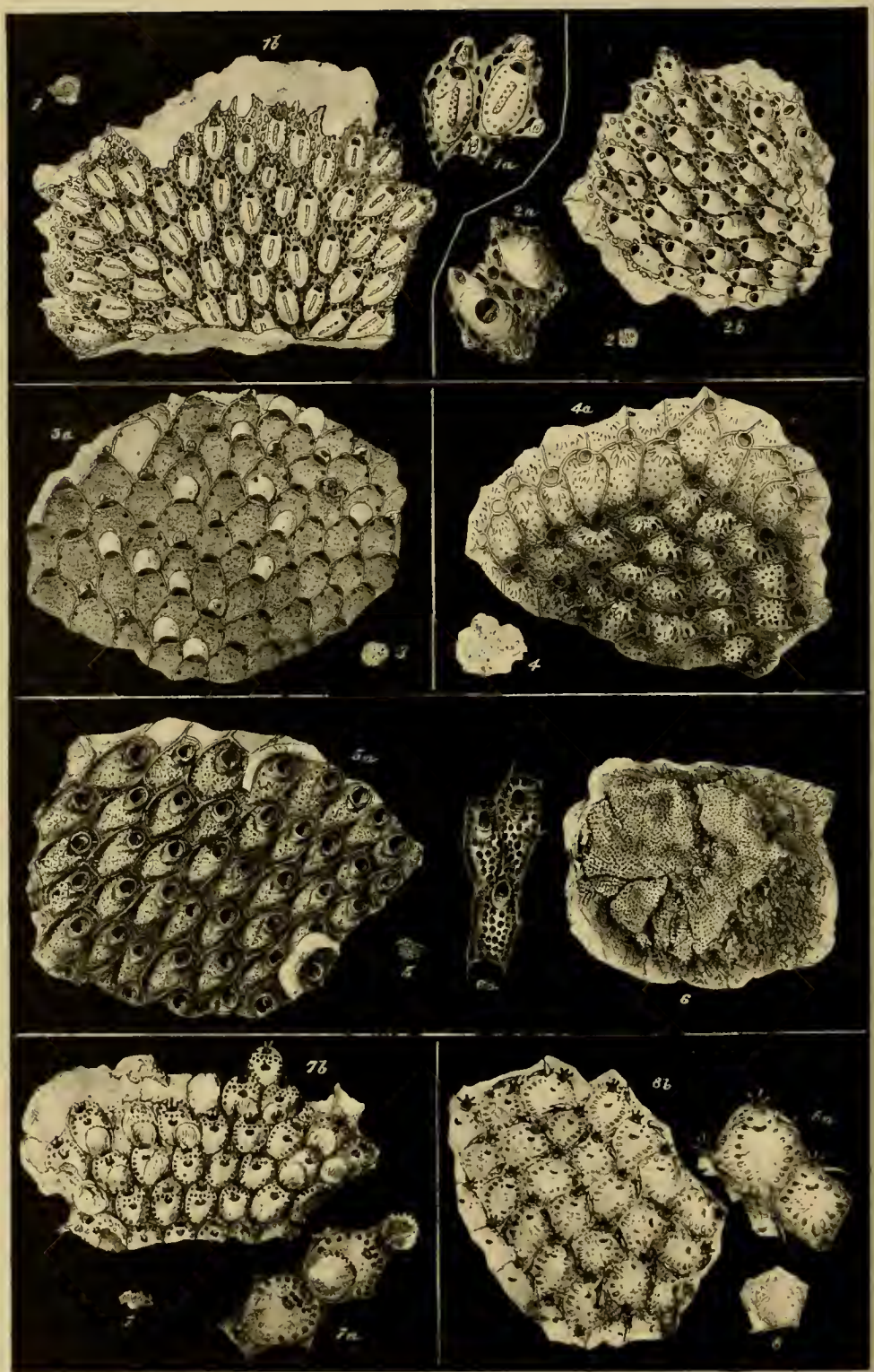
FREDERICK MCCOY.

(Polyzoa)



Pl. 5

(Polyzoa)



E. Gilks, del. et lith.

Prof. M.ᶜ Coy direx.ᵗ

J. M. Ferguson, imp.

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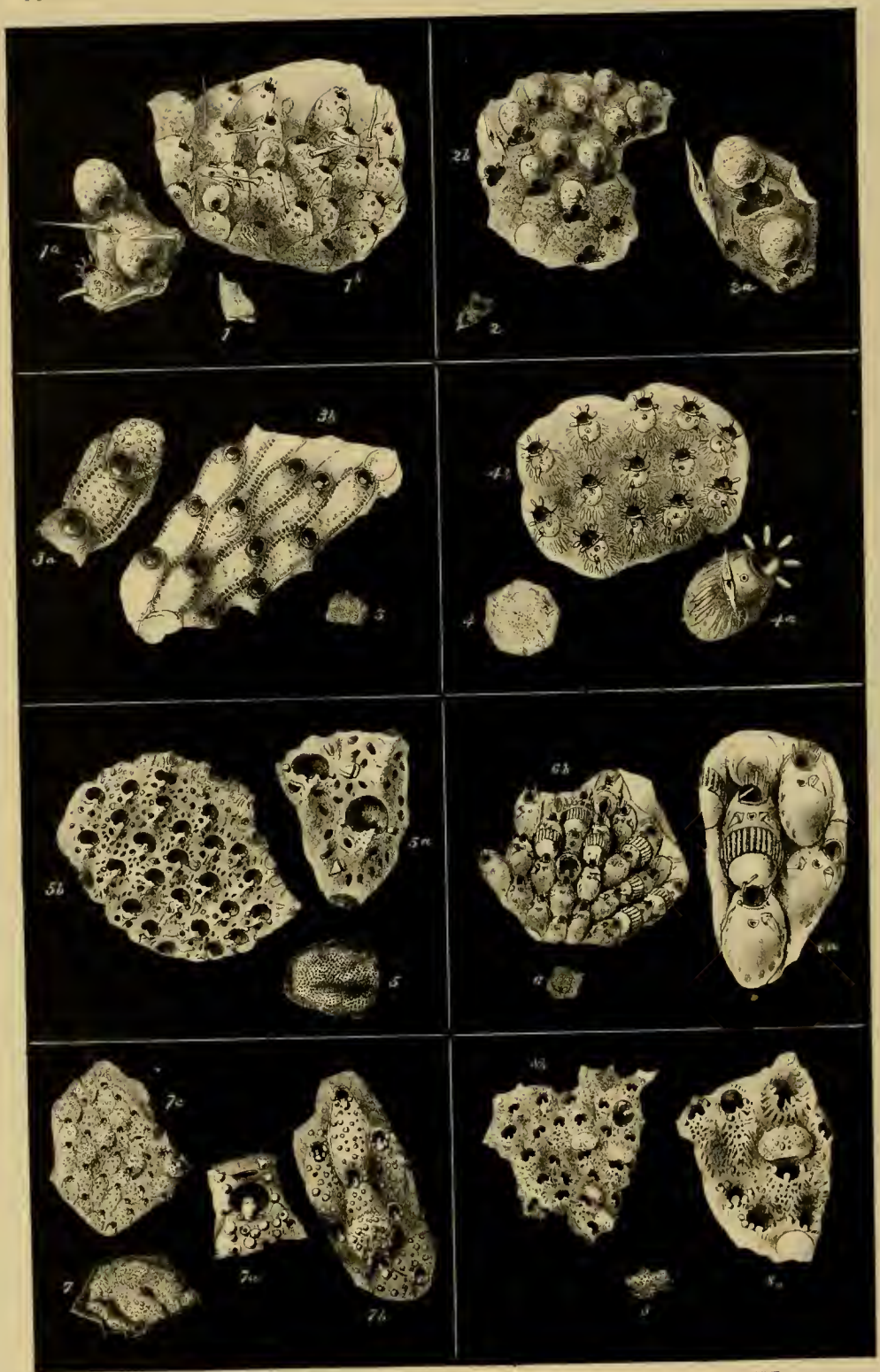

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J. M. Ferguson, 1877

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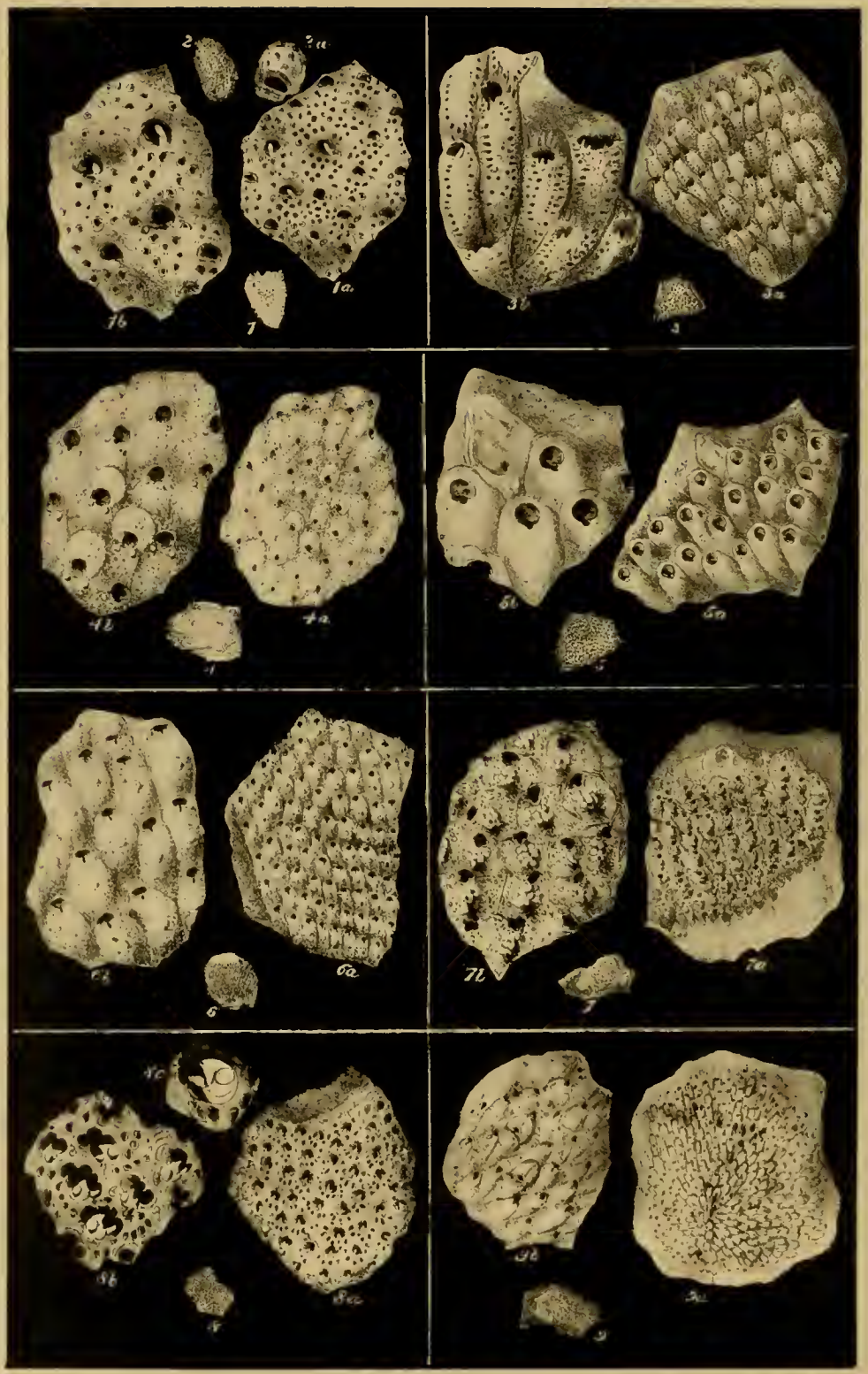

F Gilks, del et lith

Prof M^c Coy direx^t

J M Ferguson imp

Issued at the Mining & Geological Dep^t Government Printing Office Melbourne

PLATES 35, 36, 37, 38.

PLATE 35, FIG. 1.

LEPRALIA CIRCINATA (P. McG.).

[Genus LEPRALIA (JOHNSTON). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cheilostomata. Fam. Membraniporidæ).

Gen Char.—Polyzoary adnate, crustaceous or occasionally suberect, calcareous, usually spreading circularly. Cells contiguous or connected, front entirely calcareous.]

DESCRIPTION.—Cells oval, smooth, with a row of stellate pores round the margin and extending above the mouth. Mouth with two or three spines above, lower lip nearly straight with a small notch. Ovicell moderately large, smooth, slightly denticulate on the upper margin.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff, on sea-weed.

Allied to *L. Malusii*, from which it differs in the absence of the central lunate pore, in the notch in the lower lip, and the very faint dentation of the ovicell.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 1, specimen, natural size. Fig. 1*a*, portion, magnified. Fig. 1*b*, small portion, more highly magnified.

PLATE 35, FIG. 2.

LEPRALIA CECILII (AUD.).

DESCRIPTION.—Cells large, distinct, irregularly hexagonal or rounded above, surface perforated, the perforations being arranged in more or less regular lines and usually leaving a clear space down the centre; mouth arched above, straight below, with a large nearly circular sinus. Ovicell large, round, slightly granular.

REFERENCE.—*Lepralia Cecilii*, Busk., Micros. Journal, v. 173; *L. crystallina*, P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff; Warrnambool, Mr. Watts.

In this very beautiful species the cells are of large size, irregular in shape and arrangement. They are distinct and frequently separated by narrow smooth spaces, with occasionally a slightly elevated line. The whole surface, except a narrow space down

the centre, is occupied by small round perforations, arranged in irregular lines and extending above the mouth. Occasionally there is no clear central space. There is sometimes an elevated portion, or umbo, below the mouth, both forms being found in the same specimen. In a specimen contributed to the Museum by Mr. Watts from Warrnambool, the walls are much thickened and porcellaneous, and the whole surface is occupied by large openings, except in a few cells, where there is a small elevated smooth space below the mouth.

Explanation of Figures.

Plate 35.—Fig. 2, specimen, natural size. Fig. 2*a*, portion, magnified. Fig. 2*b*, single cell, more highly magnified. Fig. 2*c*, cell, with ovicell. Fig. 2*d*, single cell and outlines of two others of the porcellaneous form.

Plate 35, Fig. 3.

LEPRALIA DIAPHANA (P. McG.).

Description.—Cells distinct, smooth and diaphanous; mouth arched above, thickened and produced forwards below, with several (sometimes 5 or 6) short spines and usually a very long, jointed one articulated at one side. Ovicell small, globular, smooth.

Queenscliff; Warrnambool, Mr. Watts.

This very peculiar species can be confounded with no other that I have seen. There is a variable number of short spines on the margin of the upper lip, and at one side an excessively long spine, several times the length of the cell and consisting of numerous joints. There is occasionally one of these long spines on each side of the mouth.

Explanation of Figures.

Plate 35.—Fig. 3, specimen, natural size. Fig. 3*a*, portion, magnified. Fig. 3*b*, small portion, more highly magnified.

Plate 35, Fig. 4.

LEPRALIA MARSUPIUM (P. McG.).

Description.—Cells small, distinct, arranged in longitudinal lines; upper part, immediately below the lip, forming a large, rounded, pouch-like projection; mouth with several small spines on the upper margin. Ovicell small, globular.

Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

In this species the cells are of small size and arranged in lines. They are distinct, and the margin is occasionally faintly areolated. It is readily recognised by the large pouch-like dilatation of the upper part of the cell, on which, opposite to and frequently projecting over the centre of the lower lip, is a further rounded protuberance.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 4, specimen, natural size. Fig. 4*a*, portion, magnified. Fig. 4*b*, small portion, more highly magnified.

PLATE 35, FIG. 5.

LEPRALIA SUBIMMERSA (P. McG.).

DESCRIPTION.—Cells large, irregularly rhomboidal, separated by prominent raised lines, surface granular and perforated; mouth wide, arched above, slightly hollowed beneath; a short, nearly transverse avicularium on an elevated portion below the lower lip; ovicell large, subimmersed in the cell above, granular and perforated like the cells.

Warrnambool, Mr. Watts.

EXPLANATION OF FIGURES.

PLATE 35.—Fig. 5, specimen, natural size. Fig. 5*a*, portion, magnified. Fig. 5*b*, small portion, more highly magnified, to show ovicell, mouth, and suboral avicularium.

PLATE 35, FIG. 6.

LEPRALIA ANCEPS (P. McG.).

DESCRIPTION.—Cells large, rhomboidal, separated by prominent raised lines, surface granular and perforated; mouth arched above, lower lip hollowed into a shallow sinus, surface slightly elevated below the mouth. Ovicell large, prominent, projecting beyond the margin of the cell above over the edges of those on either side, surface largely granular and perforated.

Warrnambool, Mr. Watts.

I have some doubt whether this and the last may not prove to be forms of the same species. In both, the size and surface of the

cells are the same, and they are separated by prominent raised lines. The difference consists in the presence of a suboral avicularium in *L. subimmersa*, which may not be constant, and the different elevation of the ovicell. In *L. subimmersa* it is large, closely incorporated with the cell above, from the surface of which it is slightly raised, while in *L. anceps* it is very prominent, the free margins projecting over the edges of the cells on each side.

Explanation of Figures.

Plate 35.—Fig. 6, specimen, natural size. Fig. 6*a*, portion, magnified. Fig. 6*b*, small portion, more highly magnified, to show ovicell and mouth.

Plate 35, Fig. 7.

LEPRALIA MAPLESTONEI (P. McG.).

Description.—Cells ovate, surface perforated; mouth arched above, straight below, with a central, rounded notch, unarmed or with two or three short spines. Ovicell round, with numerous large perforations in the central part, the circumference being occupied by a smooth, thickened rim.

Williamstown, Mr. Maplestone.

In the only two small specimens I have seen, the surface is so much obscured by the ovicells that it is difficult to distinguish the real shape of the cells. The ovicells are very peculiar ; they are round, and the circumference is occupied by a thickened band which extends down each side of the mouth, terminating by forming an arched process projecting over in front of the lower lip and nearly meeting in the centre. A row of large perforations surrounds the ovicell immediately within the thickened rim, and there are other smaller ones in the central space.

Explanation of Figures.

Plate 35.—Fig. 7, specimen, natural size. Fig. 7*a*, portion, magnified. Fig. 7*b*, small portion, more highly magnified.

Plate 36, Fig. 1.

LEPRALIA VITTATA (P. McG.).

Description.—Cells ovate, separated by irregularly reticulated spaces; front of cell with a broad vitta commencing below the mouth and extending to near the base of the cell, and a row of small perforations on each side close to the margin; mouth arched above, nearly straight below. A roundish or nearly pyriform avicularium above each cell.

Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This beautiful species is at once distinguished from all others by the peculiar anterior vitta. The reticulations between the cells are formed by branching tubes.

Two small specimens found on an oyster shell from Western Port.

Explanation of Figures.

Plate 36.—Fig. 1, natural size. Fig. 1*b*, magnified. Fig. 1*a*, two cells, more highly magnified.

Plate 36, Fig. 2.

LEPRALIA BROGNIARTII (Aud.).

Description.—Cells elongate-pyriform, separated by reticulated spaces, smooth or longitudinally finely sulcate, transversely ringed; mouth arched above, nearly straight below, the lower lip thickened and projecting forwards. An avicularium above each cell. Ovicell mitriform, obscurely carinate, surmounted by a small avicularium.

Reference.—Busk, Brit. Mus. Cat., p. 65, t. lxxxi.

This is said to be a very variable species. In all the specimens I have seen the cells are separated by reticulated spaces, the reticulations being, as in the last, formed by tubes.

On calcareous nodules from Queenscliff.

Explanation of Figures.

Plate 36.—Fig. 2, natural size. Fig. 2*b*, magnified. Fig. 2*a*, two cells, more highly magnified, the lower one surmounted by an ovicell.

PLATE 36, FIG. 3.

(This represents a specimen of *Membranipora perforata* in which the cell-walls were very much thickened.)

PLATE 36, FIG. 4.

LEPRALIA ELEGANS (P. McG.).

DESCRIPTION.—Cells diamond-shaped, irregularly oval or hexagonal, separated by a thick raised margin; mouth nearly round, with a slightly thickened lip; front areolated, the areolæ frequently radiating from an elevated portion below the mouth.
REFERENCE.—P. H. MacGillivray, Trans. Phil. Instit. Vict., 1859.

On shells and stones, Williamstown and Queenscliff.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 4, natural size. Fig. 4*a*, magnified.

PLATE 36, FIGS. 5 AND 6.

LEPRALIA PERTUSA (ESPER. SP.).

DESCRIPTION.—Polyzoary large, adherent, occasionally sub-erect; cells large, elongated, separated by raised margins; surface deeply areolated or pierced with numerous large openings; mouth arched above, straight or hollowed below.
REFERENCE.—Busk, Brit. Mus. Cat., p. 80, t. lxxviii.; lxxix., 1, 2.

A common and very variable species. The cells are very large, separated by narrow, raised lines, and with large perforations, the perforations or areolæ being sometimes more regular and larger along the margins, as in Fig. 6*a*. The mouth varies in shape, being usually nearly round, with the smooth lower lip entire, prominent or with a slight sinus. In some specimens the mouth is deep,

contracted at the middle, the lower lip smooth and slightly prominent, exactly as that part is shown in Busk's figure of *L. pallasiana.*

On piles, old hulks, stones and shells, Hobson's Bay.

Explanation of Figures.

Plate 36.—Fig. 5, specimen, natural size. Fig. 5*a*, the same, magnified. Fig. 6, another specimen, natural size. Fig. 6*a*, three cells, magnified.

Plate 36, Fig. 7.

LEPRALIA MALUSII (Aud. sp.).

Description.—Cells irregular in size and disposition, usually broadly ovate and in radiating lines; mouth arched above, straight below, plain or armed with several small spines above; a lunate pore near the middle of the cell, and numerous stellate pores arranged in a single or double row beneath the mouth, and in a single row along each margin. Ovicell large or of moderate size, rounded, encroaching on the cell above, smooth, subgranular or grooved, with the superior margin dentate.

Reference.—Busk, Brit. Mus. Cat., p. 83, t. ciii., 1, 2, 3, 4.

A very beautiful species, distinguished by the lunate central and stellate suboral and marginal pores, as well as the dentate upper rim of the ovicell.

On shells and algæ, Queenscliff.

Explanation of Figures.

Plate 36.—Fig. 7, natural size. Fig. 7*b*, magnified. Fig. 7*a*, two cells, more highly magnified, showing also an ovicell with its dentate upper rim.

Plate 36, Fig. 8.

LEPRALIA LUNATA (P. McG.).

Description.—Cells rhomboidal, immersed, with a row of short grooves directed inwards along the margin; mouth straight below, with 4 or 5 spines on the upper margin; a lunate pore below the mouth; a large avicularium on one or both

sides, nearly opposite the suboral pore, directed nearly horizontally outwards, mandible pointed.

REFERENCE.—P. H. MacGillivray, Trans. Phil. Soc. Vict., 1859.

Queenscliff, on mussel shell.

EXPLANATION OF FIGURES.

PLATE 36.—Fig. 8, natural size. Fig. 8*b*, magnified. Fig. 8*a*, two cells, more highly magnified.

PLATE 37, FIG. 1.

LEPRALIA CILIATA (LINN. SP.).

DESCRIPTION.—Cells ovate, granular; mouth straight below, with several, usually 4, spines above; a lunate or roundish pore in front of the cell below the mouth, and a long slender vibraculum on one side. Ovicell large, granular.

REFERENCE.—Busk, Brit. Mus. Cat., p. 73, t. lxxiv., 1, 2; lxxvii., 3, 4, 5.

Port Fairy, Mr. Castwood; Warrnambool, Mr. H. Watts; Queenscliff.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 1, natural size. Fig. 1*b*, magnified. Fig. 1*a*, small portion, more highly magnified, showing two ovicells.

PLATE 37, FIG. 2.

LEPRALIA TRIFOLIUM (P. McG.).

DESCRIPTION.—Cells distinct, irregular in shape, frequently oval, granular; mouth trifoliate, frequently with a spine on each side of the mouth close to the angle and occasionally two others on the upper margin. Avicularia, when present, situated by the side of the mouth, mandible long, pointed. Ovicell of moderate size, globular, granular.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

In young specimens the granulations of the surface are very small, the cell wall very thin, and the cells can be seen to be separated by raised lines.

On shells, stones, and algæ, Queenscliff, Williamstown, and Western Port.

Explanation of Figures.

Plate 37.—Fig. 2, natural size. Fig. 2*b*, magnified. Fig. 2*a*, small portion, more highly magnified.

Plate 37, Fig. 3.

LEPRALIA CHEILODON (P. McG.).

Description.—Cells small, oval or elongated, separated by narrow raised lines; surface granular, frequently with a row of small areolations round the margins; mouth rounded, lip thickened and with a broad denticle inferiorly. Ovicell globular, granular.

Reference.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Old specimens become a good deal altered in appearance: the walls are thicker, the tubercles become perforated, and the marginal areolations disappear.

Williamstown, on shells.

Explanation of Figures.

Plate 37.—Fig. 3, natural size. Fig. 3*b*, magnified. Fig. 3*a*, small portion, more highly magnified.

Plate 37, Fig. 4.

LEPRALIA CANALICULATA (P. McG.).

Description.—Cells irregular, confused, immersed; mouth large, straight below, arched above, lower lip slightly thickened; 5 or 6 stiff spines on the upper border; a series of grooves extending inwards from the margin towards the clear suboral portion, in the centre of which is a round pore; a single avicularium on one side of the cell.

Reference.—P. H. MacGillivray, Trans. Phil. Inst. Vict., 1859.

Queenscliff, on a mussel shell.

Explanation of Figures.

Plate 37.—Fig. 4, natural size. Fig. 4*b*, magnified. Fig. 4*a*, a single cell, more highly magnified.

PLATE 37, FIG. 5.

LEPRALIA LARVALIS (P. McG.).

DESCRIPTION.—Cells elongated, confused, pierced towards the base by a variable number of foramina; two large openings about the middle of the cell, with a prominent ridge running between them to the point of the much projecting triangular lower lip; mouth large, arched above, and frequently with a spine on either side at the angle of junction of the upper and under lips. Avicularia large, on the side of a cell below one of the large openings.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

On algæ, Williamstown.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 5, natural size. Fig. 5*b*, magnified. Fig. 5*a*, small portion, more highly magnified.

PLATE 37, FIG. 6.

LEPRALIA DIADEMA (P. McG.).

DESCRIPTION.—Cells broad, distinct; mouth straight below, arched above, with several spines; a central roundish pore below the mouth; the edges of the cell obscurely grooved. An avicularium on one or both sides below the mouth, mandible long and pointed outwards. Ovicell with a broad band of vertical beaded lines round the upper margin.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This very beautiful species may be at once distinguished by the peculiar ovicell, the upper part of which is occupied by a broad band of vertical beaded lines, leaving a lower semicircular space smooth.

On algæ, Williamstown and Queenscliff; Warrnambool, Mr. H. Watts.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 6, natural size. Fig. 6*b*, magnified. Fig. 6*a*, small portion, more highly magnified.

PLATE 37, FIG. 7.

LEPRALIA PAPILLIFERA (P. McG.).

DESCRIPTION.—Cells ovate, distinct; surface covered with numerous hollow granulations or papillæ; mouth usually with several hollow processes and with the lower lip much produced, frequently a small square denticle inside the mouth. Ovicell large, round, and covered with hollow granulations.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This species is at once distinguished by the whole surface of the cells and ovicells being covered with short, round, irregular papillæ.

On algæ, Williamstown.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 7, natural size. Fig. 7*c*, magnified. Fig. 7*b*, more highly magnified. Fig. 7*a*, a small portion, highly magnified, showing the mouth of a cell, with a large process on the lower lip, and inside that a square denticle.

PLATE 37, FIG. 8.

LEPRALIA ELLERII (P. McG.).

DESCRIPTION.—Cells large, oblique, distinct; surface cribriform; lower lip thickened and produced into a variable number of processes, frequently a median triangular one and several smaller at the sides; in some cells the median projection has a small avicularium on one side. Ovicell broad, finely granular above.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Williamstown, on algæ and shells; Warrnambool, Mr. H. Watts.

EXPLANATION OF FIGURES.

PLATE 37.—Fig. 8, natural size. Fig. 8*b*, magnified. Fig. 8*a*, a small portion, more highly magnified.

PLATE 38, FIGS. 1 AND 2.

LEPRALIA MONOCEROS (BUSK).

DESCRIPTION.—Cells ovate, indistinct, pierced in front by a variable number of large apertures; mouth arched above, straight below, the lower lip occasionally mucronate. Avicularia scattered by the side of the mouth or between the cells. A large thick articulated vibraculum or spine below the mouth on one side. Ovicell small, roundish, or pyramidal, occasionally surmounted by one or two avicularia.

REFERENCE.—Busk, Brit. Mus. Cat., p. 72, t. xciii., 5, 6.

Queenscliff; Warrnambool, Mr. H. Watts.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 1, natural size. Fig. 1*a*, magnified. Fig. 1*b*, portion, more highly magnified. Fig. 2, another specimen, natural size. Fig. 2*a*, ovicell, magnified.

PLATE 38, FIG. 3.

LEPRALIA EXCAVATA (P. McG.).

DESCRIPTION.—Cells immersed, elongated, running in lines; elongated areolæ round the margins, leaving a narrow smooth surface in front; mouth nearly vertical to the plane of the polyzoary, its upper border armed with 4 straight stiff spines, the lower lip with a deep notch, inside the bottom of which is usually a small simple denticle.

REFERENCE.—P. H. MacGillivray, Trans. Phil. Inst. Vict., 1860.

Queenscliff, on mussel shell.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 3, natural size. Fig. 3*a*, magnified. Fig. 3*b*, small portion, more highly magnified.

PLATE 38, FIG. 4.

LEPRALIA VITREA (P. McG.).

DESCRIPTION.—Cells oval or irregularly diamond-shaped, separated by a raised line; surface granular; two short, blunt, hollow processes below the mouth; mouth lofty, margin slightly thickened, under lip with a shallow sinus. Ovicell round, granular.

Williamstown.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 4, natural size. Fig. 4*a*, magnified. Fig. 4*b*, more highly magnified.

PLATE 38, FIG. 5.

LEPRALIA MEGASOMA (P. McG.).

DESCRIPTION.—Cells large, distinct, oblique; surface smooth or obscurely grooved; mouth large, edges thickened, lower lip with a shallow notch.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff, on a mussel shell.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 5, natural size. Fig. 5*a*, magnified. Fig. 5*b*, small portion, more highly magnified.

PLATE 38, FIG. 6.

LEPRALIA SCHIZOSTOMA (P. McG.).

DESCRIPTION.—Cells elongated, distinct, arranged in lines; surface granular, granulations usually larger and closer about the middle of the cell; mouth semicircular above, lower lip straight, with a deep narrow slit in the middle. Ovicell large, granular.

REFERENCE.—P. McGillivray, Trans. Roy. Soc. Vict., 1868.

In old specimens the walls are very thick, covered with close thick granulations, and the projecting part below the mouth is very marked and forms a large rounded granular mass.

Williamstown and Queenscliff, on shell.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 6, natural size. Fig. 6*a*, magnified. Fig. 6*b*, more highly magnified.

PLATE 38, FIG. 7.

LEPRALIA BOTRYOIDES (P. McG.).

DESCRIPTION.—Cells irregular in shape, separated by a narrow, raised line; mouth hollowed below; surface granular; a cluster of blunt, hollow tubercles below the mouth.

Williamstown.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 7, natural size. Fig. 7*a*, magnified. Fig. 7*b*, more highly magnified.

PLATE 38, FIG. 8.

LEPRALIA FEROX (P. McG.).

DESCRIPTION.—Cells confused, coalescent; front pierced with several large apertures; mouth large, with one to three small denticles on one side; lower lip occupied by a large avicularium.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

This species forms small thick layers, encrusting algæ. The cells are quite undistinguishable. The mouth is very large, and usually has on one side two or three small denticles. The lower lip forms a large projecting mucro, hollowed on one side for an avicularium, and rounded on the other, from which also frequently projects a mamilliform process. The avicularium faces that side of the cell-mouth on which the sharp denticles are situated. In some specimens there are two or three short rounded processes on the upper lip.

On algæ, Williamstown and Queenscliff.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 8, natural size. Fig. 8*a*, magnified. Fig. 8*b*, more highly magnified. Fig. 8*c*, an avicularium on the lower lip (not quite accurate).

PLATE 38, FIG. 9.

LEPRALIA PELLUCIDA (P. McG.).

DESCRIPTION.—Cells small, elongated, of various shapes, usually fusiform or pyriform, distinct; surface smooth or slightly wrinkled transversely; mouth nearly circular, with a shallow notch inferiorly. Ovicell mitriform, with a projecting ridge, running vertically down the middle.

A small transparent species, occurring rarely on algæ and shells. It very much resembles *L. hyalina* (also Victorian), from which it may be distinguished by the difference in the ovicells.

Williamstown and Queenscliff, on algæ.

EXPLANATION OF FIGURES.

PLATE 38.—Fig. 9, natural size. Fig. 9*a*, magnified. Fig. 9*b*, more highly magnified.

I am indebted for the descriptions and the authentic specimens here figured of our native species of *Lepralia* to my friend, Mr. P. H. MacGillivray. All the types have been placed in the National Museum.

FREDERICK McCOY.

2c
2a
2b
1b
1
1a
3c
3b
3a
3
5a
5
4b
4a
4
5c
5d
5b

PLATE 39, FIG. 1.

CRISIA EDWARDSIANA (D'ORB. SP.).

[Genus CRISIA (Lamx.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cyclostomata. Fam. Crisiidæ.)
Gen. Char.—Two or more cells in an internode.]

DESCRIPTION.—Cells 2–3 in an internode, sparsely punctate, much elongated, upper part free and projecting forwards; mouth circular. A long, jointed spine articulated to one of the cells of an internode. Cells distinct on the back. Ovicell large, nearly round or pyriform.
REFERENCE.—*Crisidia Edwardsiana*, D'Orbigny, Voy. dans l'Amer. Mér. v. 8, t. i. 4–8.

Williamstown.

The cells are arranged in pairs, except in those internodes where a branch is given off, when there are three, the branch springing from the lowest. They are much elongated, narrow, and for a large extent, frequently nearly a half, free and turned abruptly forwards. A long, hollow, jointed spine is attached to the outer and posterior part of one, or occasionally of each cell, at or immediately above the point where it turns forwards. The joints of the polyzoary and spines are black.

EXPLANATION OF FIGURES.

PLATE 39.—Fig. 1, natural size. Fig. 1*a*, front of branchlet, magnified, showing ovicell. Fig. 1*b*, back, magnified.

PLATE 39, FIG. 2.

CRISIA BICILIATA (P. McG.).

DESCRIPTION.—Cells 2–3 in an internode, punctate, elongated, upper part free and projecting forwards; mouth circular. A pair of long, jointed spines articulated to the outer part of each cell, except to those bearing the secondary branches, a short distance below the mouth. Cells distinct at the back. Ovicells of moderate size or small, much elongated, nearly elliptical in outline, situated at the angle of a bifurcation.
REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Williamstown, Mr. Maplestone ; Warrnambool, Mr. Watts.

The aspect and general arrangement of the cells are the same in this species as in the last. There are two cells in each internode, and three in those from which the branches originate. The cells are shorter, wider superiorly, and the free part is not so long ; the ovicell is smaller, more elongated, and situated in the angle between the branches ; and each cell, in the typical form, has two long, jointed, articulated spines. One or both spines are frequently broken off, but in that case the mark of the articulation can generally be seen. Occasionally in some or all the cells, in uninjured specimens, there is only one spine. The shorter and wider cell, however, the spine originating nearer the less projecting mouth, and, when present, the smaller and narrower ovicell, are sufficiently distinctive. The joints also are light-colored.

I am doubtful to which species Busk's description and figures of *C. Edwardsiana* refer. The figures have the proportions of the cells of *C. biciliata*, and may have been taken from an imperfect specimen of the single-spined form. The ovicell, however, is differently shaped.

EXPLANATION OF FIGURES.

PLATE 39.—Fig. 2, natural size. Fig. 2*a*, front of branchlet, magnified. Fig. 2*b*, back, magnified. Fig. 2*c*, ovicell, magnified.

PLATE 39, FIG. 3.

CRISIA ACROPORA (BUSK).

DESCRIPTION.—Cells 9–13 in an internode, closely adnate throughout, surface minutely punctate; mouth nearly circular, the outer rim prolonged into a short pointed denticle. Ovicell large, pyriform, frequently annulated. Branches usually given off from the second cell, occasionally higher.

REFERENCE.—Busk, Voy. Ratt. i. 351 ; Cat. Mar. Pol. Brit. Mus. pt. iii. p. 6. pl. v. 3, 4.

Williamstown and Queenscliff.

The only Australian species with which this can be confounded is *C. margaritacea* (Busk), of which I have specimens from Queenscliff, but found too late for illustration in the present plate. It is

readily distinguished by the submarginal denticle at the back of the mouth. It is very closely allied to the European *C. denticulata.*

EXPLANATION OF FIGURES.

PLATE 39.—Fig. 3, natural size. Fig. 3*a*, front view, magnified, showing an ovicell on a twisted branch. Fig. 3*b*, back, magnified. Fig. 3*c*, ovicell.

PLATE 39, FIG. 4.

CRISIA SETOSA (P. McG.).

DESCRIPTION.—Cells 4–10 in an internode, minutely punctate, elongated, the upper part projecting slightly; mouth circular. A single long, slender, jointed spine articulated to a projection immediately below and behind the mouth. Branches given off irregularly. Joints brown.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Williamstown and Queenscliff.

This differs from all the other described multicellular species in the presence of the articulated spine.

EXPLANATION OF FIGURES.

PLATE 39.—Fig. 4, natural size. Fig. 4*a*, specimen, magnified. Fig. 4*b*, another specimen, magnified, showing an abortive internode.

PLATE 39, FIG. 5.

CRISIA TENUIS (P. McG.).

DESCRIPTION.—Cells 6–13 in an internode, much elongated, slender, closely adnate in great part of their length, minutely punctate, upper part free and turned forwards; mouth circular, unarmed. Branches given off irregularly, occasionally more than one from an internode. Ovicell small, nearly globular or pyriform, situated on the front of an internode at a bifurcation.

Queenscliff, growing on the roots of algæ.

A very distinct, small, slender, delicate species.

EXPLANATION OF FIGURES.

PLATE 39.—Fig. 5, natural size. Fig. 5*a*, specimen, magnified. Fig 5*b*, young specimen, magnified. Fig. 5*c*, portion, showing ovicell.

The beautiful drawings, as well as the original specimens and descriptions of the above species of *Crisia*, all that are at present known with certainty on the Victorian shores, have been contributed to this work by Mr. MacGillivray. I carefully supervised the lithographing of the figures, which I thought would be found all that the observer could require ; but unfortunately the plate, which was well executed by the excellent lithographic artist employed, has been so greatly damaged at the last moment that it is intended to re-issue it at a future time.

FREDERICK MCCOY.

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PLATE 40.

THE CASE-MOTHS.

The extraordinary insects figured on this plate are amongst the most curious and striking of the "common objects" in Australia, meeting the eye everywhere, from the abundance of the conspicuous protecting sacks or cases which the larvæ construct and carry about with them, hanging to the trees in all directions, fixed by the uppermost anterior end and swinging loose otherwise. In structure of the female and in habit they are the most abnormal and singular of all Lepidopterous Insects : the females being thick, smooth, naked, fleshy, grub-like creatures, totally destitute of wings, and having only minute rudimentary traces of legs, antennæ, or eyes. These apterous females never leave the sack or case in which they dwelt while in the larva state, but after meeting the males at the lower aperture of the case commence to bring forth the young in myriads ; these escaping in crowds let themselves down each by a silk thread spun from the lower lip until they reach a twig or leaf, and then immediately begin to construct each a separate case of tough silk and extraneous materials, such as particles of bark, &c., to protect it during the period of its larval existence. These larval sacks or cases are open at each end, the caterpillar coming sufficiently out of the anterior aperture to use its three pairs of thoracic legs for locomotion when feeding, usually fixing a part of the edge of the aperture by fibres of silk temporarily to the twig it is on, so that if alarmed it can suddenly withdraw completely within the case, which then remains hanging with the apertures so completely closed that, if the nature of the object was not known, it would never be suspected to contain a vigorous voracious larva. A young friend, walking with me in Richmond Park the first evening I arrived in the colony, collected a number of these cases from the

trees, and as they were too strong and tough to be opened, and were perfectly closed, it was taken for granted they were cocoons containing pupæ only, when put in his pocket; and no more was thought of the matter until they created a commotion in the drawing-room soon after by crawling actively out over the head and dress of my inquisitive friend; none of the older residents in the room having ever seen the living larvæ, or suspected their existence in the well-known cases—so vigilant and timid are the caterpillars in retreating at the approach of danger. A curious mistake is made by Mr. Westwood in describing the emergence of the male pupæ from the "apex" of the cases of some species allied to the present one. The fact is that the escape is always from the base or posterior aperture of the case, and not from the "apex" or anterior aperture, through which the head of the larvæ protrudes when walking or feeding. In both sexes the larva, when full grown and about to assume the pupa state, closes up the anterior aperture of the case and fastens it firmly to a branch or trunk of a tree; the male larva then turns itself upside down and assumes the pupa condition with its head where its tail used to be, close to the posterior or lower unattached end of the case, through the opening of which, when the time for emergence of the moth arrives, it pushes the anterior half of its length, by a slight elongation and contraction of the body, which, from the backward inclination of some small sharp spines on some of the rings, is in this way forced out head foremost, in the same manner as the pupæ of the Goat-moths and the large Swifts are made to emerge from the timber and the earth when the moth is about to escape, and leaving similarly the empty pupa skin sticking half out of the case. As the females never leave the case, they do not turn over like the males, but assume the pupa state with the head up, in the same position they occupied as larvæ, and with the posterior end of the abdomen close to the aperture in the posterior or lower free end of the case. I have no doubt that a very curious observation of Mr. Kershaw, one of the Taxidermists in the Melbourne National Museum, is perfectly true as applied to some at least of the species of these Case-bearing Moths, namely, that *the female imago never emerges from the pupa case at all*, but this hardened covering splitting open for a short

distance at the posterior end allows of all the functions necessary for the continuance of the species, and immense numbers of young are brought forth, not in the egg state, as hitherto supposed for all moths, but as exceedingly minute perfect larvæ. In confirmation of this unexpected discovery, I may mention that no eggs are ever found in the cases of the species observed in this colony, and the myriads of young produced by each female may be observed emerging in a continuous stream as minute larvæ, under circumstances which render it impossible to suppose that eggs could have been deposited.

The males of all the Case-Moths, unlike the females, are swift flyers of most extraordinary activity, dashing themselves almost to pieces as soon as they emerge, and they are remarkable also for the unusual elongation of the narrow abdomen, which they lash about and elongate in a most surprising manner. All the species are singularly rare in the moth state considering the abundance of the cases, not one in a hundred of which will be found to produce a moth, the others either dying or being attacked by several species of Ichneumon and also Dipterous parasites.

PLATE 40, FIGS. 1-6.

METURA ELONGATA (SAUNDERS SP.).

SAUNDERS' CASE-MOTH.

[Genus METURA (WALK.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Section Heterocera. Tribe Bombycites. Fam. Psychidæ.)

Gen. Char.—Male.—Body robust. Head, thorax, and abdomen densely hairy. Palpi short, inconspicuous. Antennæ shorter than the thorax, about 40 jointed, widely bipectinated below, serrated towards the apex. Abdomen long, capable of great elongation, extending at least half its length beyond the posterior wings. Legs strong, anterior pair longest, with long spines to their tibiæ; thighs and tibiæ densely pilose. Wings anterior, very narrow, pointed, straight along front edge, external margin very oblique; the usual twelve marginal veins are third and fourth subcostals (2^c and 2^d) at the apex, converge into a fork before the base reaches the upper exterior angle of the discoidal cell, where it joins the next or fifth subcostal (2^c); the next simple upper discoidal branch (x) extends from the middle of end of the discoidal cell; the lower discoidal vein (y) joins the next median vein (3^c) as a fork, the base of which, and the next two simple branches* (3^b and 3^a), join the discal areolet, which is divided longitudinally by a branching vein

* On one side in the figured specimen of *Metura elongata* the branch 3^b is forked, but the corresponding one on the other side has the normal simplicity.

Posterior wing small, very acute at the point, with a deep sinus in posterior margin from anal portion, which extends into a prominent rounded lobe; one superior vein; discal areolet divided by a forked vein; lower discoid (y) unites into a fork with the third branch of the median (3^c); submedian and internal veins distant, curved parallel.

Female.—Short, cylindrical, soft, nearly naked, without wings; eyes small; legs very minute; antennæ very short, unjointed; last two joints of abdomen slightly pilose.

Case for larvæ and female elongate fusiform, of strong silk within and added twigs on outside

Description.—*Male.*—Wings sooty-black, slightly hyaline, veins testaceous; anterior half of thorax, head and breast, end of abdomen, under side of last 5 abdominal joints, and a narrow margin to the hinder abdominal segments fulvous orange; rest of thorax and abdomen velvety-black; front of head, antennæ, and legs blackish-brown, the anterior legs banded with fulvous orange. Length when at rest, about 11 lines (but capable of extending the abdomen to nearly 2 inches); from tip to tip of anterior wings, 1 inch 10 lines; pectinated portion of antennæ nearly 2 lines, serrated apical portion slightly less. There are about 15 branches on one side and 18 on the other on the bipectinate portion of each antenna, and about 19 serrated joints beyond.

Female.—Pale brownish cream-color, head and thoracic segments light-brown, fleshy, smooth, the last two or three joints fringed with scanty hairs; legs very minute, antennæ nearly obsolete, scarcely visible to the naked eye. Length, about 1 inch 6 lines; width, about 5 lines.

Larva.—Head and thoracic segments black, mottled with pale testaceous brown; rest of body dull hazel-brown. Length of female, about 2 inches; width, 5 lines. Male similar, but about one-third less.

Case.—Fusiform, of tough brownish-grey silk set with numerous irregular rows of rather distantly separated subalternate small twigs, rather less than 1 line in diameter, and varying from $\frac{1}{2}$ inch to 1 inch in length, except at the posterior end, where several of them are 3 or 4 inches long. Length of case of male, about 4 inches; greatest width at middle, about 9 lines. Female case, one-third larger.

Reference.—*Oiketicus elongatus* (Saunders), Tr. Ent. Soc., v. 5, p. 43; = *Oiketicus Saundersi* (Westw.), Proc. Zool. Soc. 1854, p. 223, t. 35.

The larvæ and cases of this species far exceed any of the others in size, and when, as last year, they are unusually abundant they attract the attention of the most incurious observer. The larvæ are found indifferently not only on a great variety of native trees, but on a singular variety of imported foreign trees and shrubs in the gardens round Melbourne. The size of the Victorian specimens is slightly less than that of the New South Wales examples, but I do not think there is any specific difference.

Explanation of Figures.

Plate 40.—Fig. 1, male, natural size. Fig. 2, male larva, with case, natural size. Fig. 3, larva of female, viewed from above, natural size. Fig. 4, ditto, side view, removed from case. Fig. 5, outline of anterior wing, magnified, to show the different veins lettered and numbered as in the above generic character. Fig. 6, one of the antennæ, magnified, to show the wide bipectinate basal half and narrow serrated distal half.

PLATE 40, FIGS. 7–15.

ENTOMETA IGNOBILIS (WALK.).

THE LICTOR CASE-MOTH.

[Genus ENTOMETA (WALK.). (Sub-kingd. Articulata. Class Insecta. Order Lepidoptera. Sect. Heterocera. Tribe Bombycites. Fam. Psychidæ.)

Gen. Char.—Male.—Body stout, very pilose. Head moderately prominent. Palpi very stout, pilose, projecting a little beyond the head; third joint minute, conical. Antennæ longer than the thorax, deeply bi-pectinated to the tips. Abdomen extending beyond the hind wings. Legs stout, pilose; hind tibiæ with small apical spurs. Wings pilose, nearly opaque; anterior pair rather long, narrow towards the rounded tips, straight along the costa; exterior border very oblique, slightly excavated; inner angle rounded, obtuse; hind wings obliquely rounded, without sinus. *Female* without wings or legs. Australia and Tasmania.]

DESCRIPTION.—*Male.*—Brown. Wings smoky-brown, slightly hyaline with a small dark spot at end of disc on upper wings; anterior ones acute, exterior border nearly straight, very oblique. Head, thorax, legs, and abdomen dull ochraceous; palpi whitish; tip of tail darker brown. Palpi porrect, not extending beyond the head. Antennæ slightly longer than thorax, broadly bipectinated, gradually narrowing to the apex. Length of body, 9 lines; expanse from tip to tip of wings, 1 inch 4 lines. Pupa dark-brown, slender, with wings, &c., marked; length, 10 lines; width, 3 lines.

Female.—Short, fusiform, thick; cream-colored, except the thoracic segments and head, which are brown; surface naked, except a slight pilose fringe on hind segments. Length, 11 lines; diameter, 5 lines. Pupa nearly the same size and shape but dark-brown, with blackish transverse bands; the stigmata on the sides very distinct.

Case of male formed of a flexible tubular portion covered with small grains of bark, &c., from $\frac{1}{4}$ to $\frac{1}{2}$ an inch long, and 3 lines wide in front and behind; the middle portion like a cylindrical bundle, $\frac{1}{2}$ an inch in diameter, of straight sticks, each about 1 line in diameter, rounded at the cut ends, each firmly fixed by the whole inner side to the silk lining of the case; the twigs are about 1 inch long, but one or two usually much longer at the posterior end (apparently for the legs of the imago to lay hold of when drawing itself out of the pupa skin). Case of female of about fourteen sticks, $1\frac{1}{2}$ inch long and 8 lines in diameter.

REFERENCE.—Walker, Char. Undescr. Lepidop. Heteroc., p. 67.*

The cases of this species are so excessively abundant that scarcely a tree in the colony can be found without many of them hanging from it. They chiefly frequent the *Eucalypti* or so-called

* I may mention that the *Entometa despecta* described in the above work has really no relation to this genus. The larvæ have no case, and in size and shape resemble those of the English "Drinker-moth," *O. potatoria*, with two filaments from the third segment and a conical projection like that of a Hawk-moth from the penultimate segment; and the females are large, with well-developed legs and wings, much larger than those of the male; the cocoons are of white silk, with leaves or grass on the outside.

Gum-trees, but are also common on many others of the most diverse botanical characters. At least ten thousand of this species can be found to one of any of the other of the Case-Moths or House-builder Moths as they are often called. The name Lictor-Moth is suggested by the resemblance of the case to the fasces or bundles of rods borne by the Lictors of old before the Roman magistrates.

All the summer the larvæ are found feeding. The smaller cases, which belong to the males, are often seen to have the empty pupa case sticking rather more than half out of the posterior tubular aperture, beyond the bundle of sticks, hanging head downwards. From the larger female cases, in February, multitudes of young larvæ, about 1 line in length, may be seen descending by long slender threads of silk emitted from the lower lip, thus escaping from the lower tubular aperture of the case, and reaching some twig or leaf of the tree. They immediately begin to spin a silk-case for themselves, fastening grains of wood or bark into its outer surface ; the young larvæ have only this flexible covering until a considerable size is obtained, when the larva chooses and cuts about one inch in length of a slender bit of straight twig, fastening one end of it to the case, then another, and so on until the ordinary number of rods are strung by the upper end round the case ; these are ultimately fastened in the whole length as the larva reaches the full size. The perfect insects have not been figured before, and are surprisingly difficult to procure, owing to the destructive effects of the attacks on the larvæ of several species of Ichneumon and Dipterous parasitic Flies.

Explanation of Figures.

Plate 40.—Fig 7, male, natural size. Fig. 8, larva and case of female, natural size. Fig. 9, case of male with empty pupa (sticking out), from which the perfect moth has emerged, natural size. Fig. 10, case of adult perfect female, with strings of young larvæ escaping. Fig. 11, adult perfect female, natural size. Fig. 12, female pupa, natural size. Fig. 13, male pupa, natural size. Fig. 14, anterior wing, magnified, showing the different veins numbered as in the preceding species. Fig. 15, hinder wing, showing veins and the long bristle from base of anterior border to connect with loop of anterior wing. Fig. 16, one of the anteunæ, maguified to show the number and gradual diminution towards apex of the pectinations.

The branch (y), which is assumed in this genus to be absent, is, on one side of the specimen figured on our plate, extended half way from the disc to the margin.

Frederick McCoy.

By Authority : John Ferres, Government Printer.

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MARY D ROGICK

Natural History of Victoria.

PRODROMUS

OF THE

ZOOLOGY OF VICTORIA;

OR,

FIGURES AND DESCRIPTIONS OF THE LIVING SPECIES OF ALL CLASSES

OF THE

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BY

FREDERICK McCOY, F.R.S.,

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M DCCC LXXX.

PREFACE.

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It having been considered desirable to ascertain accurately the natural productions of the Colony of Victoria, and to publish works

ERRATUM.

Pages 11 and 12, and on Contents of Decades, *for* "LYMNODYNASTES" *read* "LIMNODYNASTES."

and Stawell completing the subject, namely, that of the Zoology or indigenous members of the different classes of the animal kingdom.

As the Fauna is not so well known as the Flora, it was a necessary preliminary to the publication to have a large number of drawings made, as opportunity arose, from the living or fresh examples of many species of reptiles, fish, and the lower animals, which lose their natural appearance shortly after death, and the true characters of many of which were consequently as yet unknown, as they had only been described from preserved specimens. A Prodromus, or preliminary issue, in the form of Decades, or numbers of ten plates, each with its complete descriptive letterpress, will be published, of

such illustrations as are ready, without systematic order or waiting for the completion of any one branch. The many good observers in the country will thus have the means of accurately identifying various natural objects, their observations on which, if recorded and sent to the National Museum, where the originals of all the figures and descriptions are preserved, will be duly acknowledged, and will materially help in the preparation of the final systematic volume to be published for each class when it approaches completion.

This fifth Decade gives figures and descriptions in the first plate of the largest of the Victorian Reptiles, the Lace Lizard, or Coast Lizard, or Iguana as it is often called erroneously.

The second plate figures, for the first time in the natural colors, two of our more curious Frogs, one remarkable for its habit of burying itself underground during the day in waterless localities to avoid the scorching rays of the sun, but coming on the surface during the dewy nights, furnishing welcome food to the nocturnal snakes of those regions.

The third plate shows the characters of two of the more interesting Sharks of our coast.

The fourth plate gives evidence of the identity of the Tunny and the Barracouta of our waters with those of Europe and South Africa respectively.

The fifth to the ninth plates continue the illustrations of our Polyzoa, in which the Victorian waters are proving richer than any other part of the world, and in which, as before, I have had the assistance of my friend, Dr. MacGillivray, who has presented all his specimens here described to the National Museum for reference.

The tenth plate illustrates the characters of two species of those most interesting insects, the *Cicadæ*, one of them being the producer of the Australian Manna from the *Eucalyptus viminalis*, which it frequents.

The succeeding Decades will illustrate as many different genera as possible, and will deal first usually with species of some special interest, and of which good figures do not exist, or are not easily accessible.

FREDERICK McCOY.

19th June 1880.

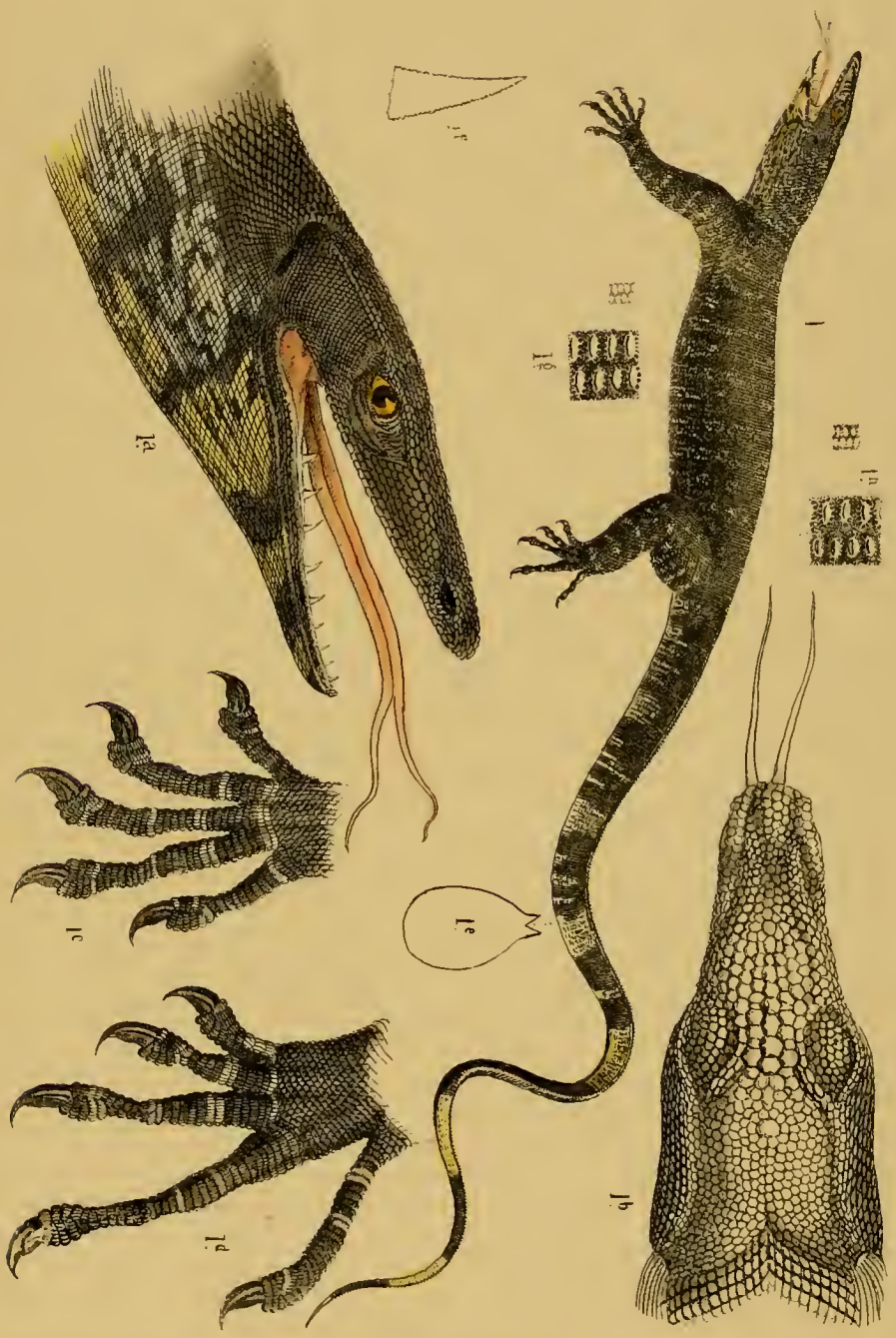
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PLATE 41, FIG. 1.

HYDROSAURUS VARIUS (SHAW SP.).

THE LACE LIZARD.

[Genus HYDROSAURUS (WAGLER). (Sub-kingd. Vertebrata. Class Reptilia. Order Sauria. Sub-Order Leptoglossæ. Fam. Monitoridæ.)

Gen. Char.—Nostrils longitudinally oval, near the tip of sides of muzzle; tail long, slender, compressed, with a small double dorsal keel of 2 longitudinal rows of scales a little larger than those of sides. Toes long, slender, unequal, separate, terminated each by a large, short, curved claw. Teeth lodged in a furrow in the jaws (none on the palate), compressed, the two edges serrated. Scales small, granular, not imbricated, each surrounded with smaller granules. Australia and Asia.]

DESCRIPTION.—*Form:* body very elongate, ovate, slightly depressed; tail very long, moderately compressed; head oblong, flattened above, with nearly vertical sides tapering to the semielliptically rounded muzzle; nostrils near the tip of snout, longitudinally oval; a laterally-projecting ridge over each eye; plates about the orbit very small, subequal. *Teeth:* about 10 or 11 on each side in each jaw, the middle ones largest; triangular, gently arched backwards, very much compressed, the sharp anterior and posterior edges very finely serrated. *Scales:* small, convex, oval, surrounded with granules, those of head polygonal, small, subequal; those of superciliary ridge very small, subequal. *Color:* all above coal-black, the body with about a dozen transverse bands of short, interrupted, transverse lines of pale yellow, about a scale wide, the bands varying from 2 to 10 scales wide irregularly, with usually a few large, irregular yellow blotches, about 3 scales long and wide on the back; the anterior legs and toes have irregular bands of yellow scales of very varying width and disposition, the hinder legs having the yellow disposed more in the form of transverse rows of spots; about 3 or 4 strongly marked black bands across the throat, with the intervening broad spaces bright chrome-yellow, behind which, on lower part of neck, the light parts are tinted with cobalt-blue; iris yellow; tail with very variable, transverse, narrow, yellow lines until near the extremity, where one or two patches, 30 to 50 scales long, are usually nearly or quite uninterrupted yellow, a variable length of the tip of the tail being usually also of the same color; on underside the pale yellow preponderates over the narrow, irregular, black markings.

The following are the measurements of the young, figured specimen, and one of average size:—

Measurements.	Young, figured, Specimen.			Average-size Specimen.		
	ft.	ins.	lines.	ft.	ins.	lines.
Total length	2	10	6	5	0	0
Length of tail	1	9	6	3	1	0
„ of head	0	2	3	0	4	6
„ of gape	0	1	9	0	3	9
„ from tip of muzzle to anterior edge of nostril	0	0	4	0	0	7
„ from tip of muzzle to anterior edge of orbit	0	1	3½	0	2	5
„ from tip of muzzle to ear	0	2	3½	0	4	5

Measurements, &c.—*continued.*

Measurements.	Young, figured, Specimen.			Average-size Specimen.		
	ft.	ins.	lines.	ft.	ins.	lines.
Diameter of orbit	0	0	4	0	0	5
Width of forehead between eyes	0	0	10	0	1	7
Length from tip of snout to shoulder	0	5	6	0	8	6
„ of inner toe of anterior foot	0	0	5	0	0	6
„ of claw of ditto	0	0	4½	0	0	9
„ of 2nd toe	0	0	9	0	1	1
„ of claw of ditto	0	0	5½	0	0	11
„ of 3rd toe	0	1	0	0	1	3
„ of claw of ditto	0	0	6	0	0	9
„ of 4th toe	0	1	1	0	1	6
„ of claw of ditto	0	0	5½	0	0	9
„ of 5th toe	0	0	7	0	1	1
„ of claw of ditto	0	0	5½	0	0	9
„ from shoulder to base of 3rd claw	0	2	9	0	6	0
Girth of body	0	7	0	1	3	0
Length from tip of snout to hind leg	1	6	0	1	10	0
„ of hind leg to base of 3rd claw	0	3	6	0	7	3
„ of inner toe of hind foot	0	1	0	0	1	3
„ of claw of ditto	0	0	5	0	0	8
„ of 2nd or longest toe	0	1	6½	0	2	1
„ of claw of ditto	0	0	5	0	0	9
„ of 3rd toe	0	1	1	0	1	6
„ of 4th toe	0	0	9	0	1	0
„ of outer or shortest toe	0	0	5	0	0	7
„ of claw of ditto	0	0	4½	0	0	7
„ of largest teeth, about middle of jaw	0	0	1½	0	0	2
„ of antero-posterior diameter of largest tooth	0	0	0½	0	0	1¼
„ of transverse diameter of largest tooth	0	0	0¼	0	0	0¾
Granular scales in middle of back in space of 6 lines	ten			five		

REFERENCE.— = *Lacerta varia* (Shaw), White, Journ. N.S.W., t. 3, f. 2.

This is by far the largest of the Victorian Lizards, sometimes reaching 6 feet in length, and from its fierce, bloodthirsty disposition is a most unwelcome visitor to the poultry yards, from which it occasionally carries off the chickens. Its usual food is the common Opossum, and various smaller mammals and birds. It is often popularly called *Iguana* by the settlers, but the English name originally given by Shaw is more desirable, as there is no near affinity with the herbivorous true Iguana, in which the body has a dorsal crest, a dilatable throat, a thick, wide, slightly notched tongue, imbricated body scales, and different maxillaries and dentition.

The color varies greatly, being different in every individual in the relative proportion of the yellow and the black. Our figure and description indicate the commonest marking, but in some even the usual strong, transverse, black bands on the throat are absent.

Like all of the family *Monitoridæ* or *Varanidæ*, this species has the body elongate, rounded, and without dorsal crest, carried by four strong legs, with unequal, distinctly-separated toes, each terminated by a large, powerful, arched, compressed, sharp-pointed claw; and the tail, which is usually at least twice the length of the body in the Monitors, is moderately compressed, and surmounted by two small scaly ridges. Like the other Monitors, the whole surface of the body is covered with small, oval or oblong, convex scales, each surrounded by small granules, and not imbricated. The tongue, as in the rest of the family, is slender, forked, fleshy, like that of a snake, and retractile into a pouch at its base.

Although the present Lace Lizard is generally arboreal, climbing the forest trees with ease, and running well on the ground, it can swim nearly as well as a Crocodile; and, from being thus seen in some of the Gippsland rivers, the idea has arisen that there are Crocodiles in that part of the colony. None of the family *Crocodilidæ*, however, occur in Victoria; the large claws on all the toes, and absence of webs between the toes of the hind feet, as well as the slender tongue, and absence of large, bony plates on the back, easily distinguish the Lizards of the present family from those of the *Crocodilidæ*, or true Crocodiles. In the long, slender, forked tongue, sheathed at base, as well as in the structure of several bones of the head, there is a singular approach to the *Ophidia*, or Snakes, in the Lizards of the family *Monitoridæ*, of which *Hydrosaurus varius* is the only example known in Victoria; and in the osteology the approach to the extinct fossil Saurians of the Mesozoic formations is no less striking to the European geologist.

This large Lizard is very common in the warmer parts of the colony, particularly on the Murray plains. I have heard of specimens 7 or 8 feet long, but have not seen them more than 6 feet. They are very voracious, and eat living or dead animals. They are generally found in hollow trees or holes in the ground. They lay about a dozen large, tough, flexible, white eggs, about $2\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches wide, the young in which are 9 or 10 inches long.

Explanation of Figures.

Plate 41.—Fig. 1, side view of young specimen, greatly reduced. Fig. 1*a*, side view of head and neck of same, small specimen, natural size. Fig. 1*b*, top view of same, to show the scales. Fig. 1*c*, anterior foot of same small specimen, natural size. Fig. 1*d*, ditto, hind foot (in both feet the perspective makes the arched claws look shorter than their correct length as given in the above measurements). Fig. 1*e*, section of tail, natural size. Fig. 1*f*, tooth, magnified, to show the serration (the outline should be slightly more curved). Fig. 1*g*, scales and surrounding granules, from side, natural size and magnified. Fig. 1*h*, scales and granules of back, natural size and magnified.

Frederick McCoy.

Pl. 47.

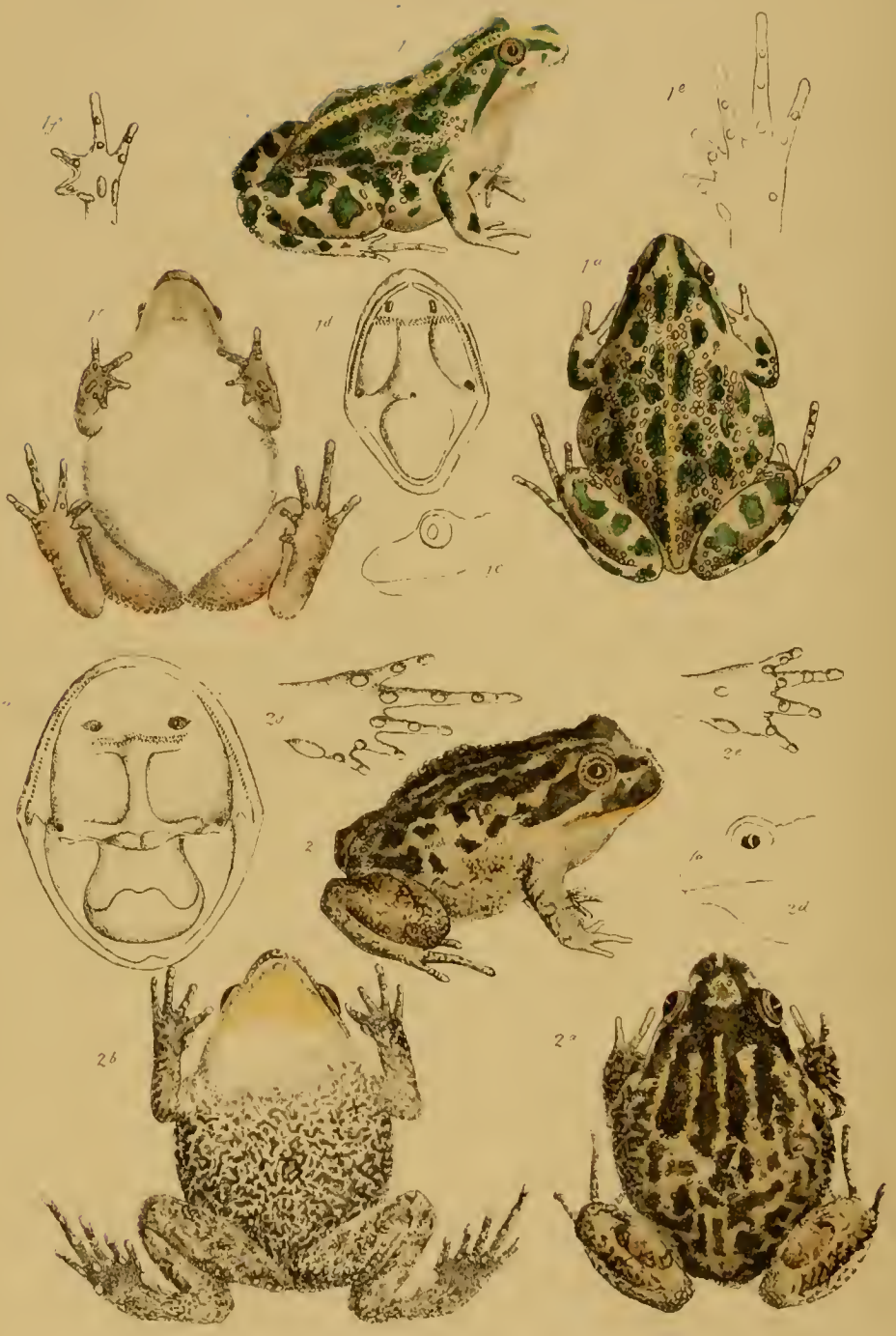

PLATE 42, FIG. 1.

LYMNODYNASTES TASMANIENSIS (GÜNTH.).

THE SPOTTED MARSH-FROG.

[Genus LYMNODYNASTES (FITZINGER). (Sub-kingd. Vertebrata. Class Reptilia. Order Batrachia. Sub-Order Anoura. Fam. Cystignathidæ.)

Gen. Char.—General form broad and short; head moderate; limbs rather short; fingers quite free; hind toes free, or very slightly webbed; skin smooth, or with scattered, depressed tubercles; with or without large gland on hiud leg; tubercles under metatarsus soft, rounded, without sharp edge; palatine teeth in a nearly straight transverse band behiud the inner nostrils, scarcely interrupted in the middle. Tongue rounded, very slightly notched. Openings of the inner nostrils and of the Eustachian tubes moderate. Tympanum of ear not distiuctly visible externally. Males with a vocal sac under the throat. Australia.]

DESCRIPTION.—Head moderate, semi-elliptical; snout slightly produced beyond lower jaw, depressed, flat; nostrils nearer tip of snout than eyes. No large gland on calf of leg. Tongue rounded, with scarcely perceptible notch. Eyes moderate in size and prominence. Metacarpus below with 3 small elongate tubercles (that of the thumb or inner side largest); metatarsus below with 2 very small rounded, soft tubercles; tympanum slightly visible; surface of back nearly smooth, with scattered, small, slightly prominent, rounded tubercles; two inner fingers with membranous border in adult female; toes very slightly webbed at base, slightly bordered. *Color:* ground color of upper surface varying from light stone-grey to nearly black, with 3 or 4 rows on each side of elongate, rounded, or oblong patches or spots with jagged edges of sap-green (becoming brown in spirit), each leg with 3 or 4 transverse patches of similar shape and color, and smaller spots on arm and feet; a longer streak of the same color from the snout through the nostril to the eye, and thence tapering to the point of the shoulder; underside of throat, body, and legs pearly-white; usually a narrow light stripe along middle of back from tip of snout to posterior end, but often indistinct. A whitish glandular ridge from eye to end of green band near shoulder behind the angle of mouth. Iris golden bronze.

REFERENCE.—Cat. Brit. Mus. Batrac. Sal., p. 33, t. 11, fig. B.

This beautiful little species is not uncommon in marshy places and shallow waters about Melbourne, where it forms a favorite food of snakes. At the end of November the young, about 1 inch long, takes to the land, having its four limbs perfect, but with a tail of half an inch long remaining. The diapophyses of the last sacral vertebræ are only slightly widened at their distal ends.

The color of the spots is erroneously said by Dr. Steindachner (Reise der Österreichischen Fregatte Novara) to be brown, speci-

mens in spirit taking this hue. It has not been figured of its natural colors before.

EXPLANATION OF FIGURES.

PLATE 42.—Fig. 1, side view, one-fourth larger than nature. Fig. 1*a*, back view of ditto. Fig. 1*b*, underside of ditto. Fig. 1*c*, profile of ditto. Fig. 1*d*, mouth, showing openings of the two nostrils and two Eustachian tubes, and the transverse band of palatine teeth, with the heart-shaped tongue with an almost imperceptible notch on hinder edge, enlarged. Fig. 1*e*, underside of hind foot, enlarged. Fig. 1*f*, underside of anterior foot, enlarged.

PLATE 42, FIG. 2.

LYMNODYNASTES DORSALIS (GRAY).

THE COMMON SAND-FROG.

DESCRIPTION.—Head rather large, broad, semi-elliptical; snout thick, only moderately elongate, bluntly rounded; eyes moderately large; a large, oval, swollen gland on the calf of each leg; tongue rounded, very slightly notched behind; straight transverse band of palatine teeth, interrupted in the middle; metacarpus with a large, soft, oval, white tubercle on inner edge, and a much smaller, rounded one in the middle of underside; underside of metatarsus with only one large, oval, soft, white tubercle on inner edge, and none in the middle; skin with numerous very small tubercles. *Color:* above dull yellowish-grey, with large very irregular longitudinal patches, with jagged edges, of dark-grey or blackish; a more or less distinct, narrow, straight, light stripe along middle of back from tip of snout to posterior end (sometimes nearly obliterated by the encroaching irregularities of the dark blotches); legs and sides irregularly mottled with much smaller, vermicular, dark markings; underside of legs and belly marbled with small, close, vermicular markings of liver-color or chocolate on whitish ground; throat dull, yellow-ochre with or without the markings of the belly; a dark band from tip of snout to eye, and a dark and broader one with a yellow under-edge from eye to shoulder. Iris golden bronze; nostrils midway between eye and tip of snout.

REFERENCE. = *Cystignathus dorsalis* (Gray) in Eyre's Central Australia, t. 1, f. 2; Günth. Cat. B. M. Batrac. Sal., p. 33.

This curious Frog is easily distinguished from the *L. Tasmaniensis* by the large, swollen, oval gland on the calf of each leg, as well as by the darker coloring of the back and the dark chocolate marbling of the underside, the broader and thicker head, and the smaller number of tubercles on the underside of the ankle and wrist joints;

the palatine bands of teeth are more divided in the middle, and the notch of the tongue is slightly larger. The diapophyses of the last sacral vertebræ are only slightly dilated.

Some of the large specimens agree more exactly in markings with Gray's figure than ours, which latter shows an extreme of darker and closer marking and no distinct dorsal stripe ; there are, however, all varieties between these extremes.

The oddest characteristic of this species is its habitually burying itself seven or eight inches under the surface of the light sandy soil of Brighton and other similar localities on the south coast, where it may be dug out any day in considerable numbers ; only coming out by night to feed on the large nocturnal spiders which abound on the surface at the same time. These localities, in which the Sand-Frog most abounds, are entirely waterless, and the habit of burying itself in the sandy ground by day keeps it from the scorching rays of the sun, while the habit of coming to the surface and running over the ground by night introduces it to the snakes, which in such arid plains one would expect to have little chance of meeting batrachian food, of which it is evident they are very fond, from the abundance of the remains found on opening them. A similar habit of covering itself by day in light soil, it will be remembered, Mr. Darwin observed in some of the South American Frogs ; although my first statement of its being observable in Australia in this species has been contradicted by a writer in Sydney, who does not seem to have met the creature, which may be turned up with the spade, however, in any of the gardens of the locality I mentioned. It has not been figured of the natural colors before.

Explanation of Figures.

Plate 42.—Fig. 2, profile view, natural size. Fig. 2*a*, upper view, natural size. Fig. 2*b*, under view, natural size. Fig. 2*c*, mouth, twice the natural size, showing the maxillary and palatine bands of teeth, the openings of the nostrils and Eustachian tubes, and the tongue, the notch of which is a little exaggerated by being drawn forward. Fig. 2*d*, profile, to show thick muzzle with little projection of upper jaw, and central position of nostrils. Fig. 2*e*, underside of anterior foot, once and a half larger than nature, to show the tubercles. Fig. 2*f*, underside of hind foot, once and a half larger than natural size.

Frederick McCoy.

Pl 13

ZOOLOGY OF VICTORIA
(Fishes)

F Schoufeldt lith *Prof. M'Coy direx'* *Hamel & Co imp.*

PLATE 43, FIG. 1.

CROSSORHINUS BARBATUS (LIN. SP.).

THE CARPET SHARK.

[Genus CROSSORHINUS (MÜLL. and HENLE). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Section Selachoidei. Fam. Scylliidæ.)

Gen. Char.—Two dorsal fins, without spines, the 1st just behind the ventral, the 2nd in front of the anal, which is close to the caudal. Tail small. Head broadly rounded with numerous, flat, skinny appendages on the sides. Eyes very small. Spiracles extremely large, lunate, nearly equalling the gill-openings, a little behind and below the eye. Nasal and buccal cavities confluent; a free nasal cirrus. Mouth opening nearly at the anterior edge of the head, upper and lower lips well developed. *Teeth* nearly similar throughout in both jaws; of a central cusp, sub-compressed, conical, narrow, pointed; base moderate, without cusps, but with a small median lobe pointing to the base. Gill-openings very small, the 4th and 5th rather smaller and closer than the others, and situated behind the anterior edge of the pectoral fin. Japan and Australasia.]

DESCRIPTION.—Broadly ovate, body slightly depressed as far as the dorsal, slightly compressed as far as the tail. Tail rather abruptly narrowed, small. Two large, three-branched nasal cirri, one at inner base of each nostril, behind which, along a line to a little beyond corner of mouth, are 5 flat, more or less lobed, skinny appendages; a 6th, much larger, wider, flatter, bifid or trifid one halfway to the anterior gill-opening; and a 7th, slightly smaller, halfway between the 6th and the gill-opening. A prominent ridge over and behind each eye, having 2 small lobes on the anterior end over the eye. Distance between the dorsals about equal to the length of the base of the anterior one. *Color:* ground-color of entire body a brownish ashy grey; plain on the whole of the under surface, but thickly spotted with two shades of rich brown on the top and sides of the head, the lighter of these brown tints enlarging from behind the eyes to the extremity of the tail on the whole of the upper surface of the body and fins into large, irregular patches, leaving jagged, irregular, unequal cloudings of the greyish ground color, with small spots of the darker brown irregularly scattered round the edges of the light patches; the largest of these light-grey mottled spaces with dark-brown spotted edges are disposed in conspicuous transverse patches on the tail.

REFERENCE.=*Squalus barbatus* (Lin.), S. N., p. 1493; =*S. lobatus*, Bl. & Schn., p. 137; =*S. appendiculatus* (Shaw), Nat. Misc., t. 727; =*Crossorhinus barbatus* (Müll. and Henle), Syst. Besch. Plagiostomen, p. 21, t. 5.

The following are the measurements of the male figured specimen :—

Measurements.	ft.	ins.	lines.
Length from tip of snout to distal end of caudal	7	10	0
" " " anterior edge of anterior dorsal ...	4	1	6
" " " anterior edge of second dorsal ...	5	2	6
" " " anterior edge of pectoral ...	1	10	6
" " " anterior edge of ventral	3	9	0
" " " anterior edge of anal	6	1	0
" of anterior edge of pectoral	1	2	0
" of posterior margin of pectoral	1	0	6
" of anterior edge of ventral	0	8	0

Measurements—*continued.*

Measurements.	ft.	ins.	lines.
Length of posterior margin of ventral	0	8	0
„ of claspers of male	0	8	0
„ of base of 1st dorsal	0	6	0
„ of anterior margin of 1st dorsal	0	7	0
„ of base of 2nd dorsal	0	6	6
„ of anterior margin of 2nd dorsal	0	6	0
„ of base of anal	0	3	6
„ of anterior margin of anal	0	3	0
Greatest depth of middle of caudal fin	0	1	6
Length of anterior edge of posterior terminal portion of caudal beyond notch	0	3	0
Length from tip of snout to anterior margin of eye	0	7	4
Diameter of eye	0	0	9
Distance between eyes	0	5	6
„ from posterior edge of orbit to middle of spiracle ...	0	1	9
Length of spiracle	0	2	9
„ from anterior gill-opening to tip of snout	1	4	6
„ of largest anterior gill-opening	0	2	6
Girth in front of pectoral	3	5	0

This most beautiful Shark is not very uncommon in Hobson's Bay, three fine specimens being in the Museum collection. The coloring varies in size and shape of the cloudings and spottings a little ; and the number of lobes into which the skinny appendages of the sides of the head and neck are divided is so irregular that the two sides are often dissimilar in one individual.

Explanation of Figures.

Plate 43.—Fig. 1, side view of average male specimen, showing the claspers beyond the ventral fins, reduced. Fig. 1*a*, head of ditto, viewed from above, to show the form and disposition of the appendages and spiracles. Fig. 1*b*, side view of mouth. Fig. 1*c*, front view of mouth, showing the number of rows of teeth in use. Fig. 1*d*, one of the teeth, natural size, showing the median lobe of the base.

Plate 43, Fig. 2.

NOTIDANUS (HEPTANCHUS) INDICUS (Cuv.).

The Seven-Gilled Shark.

[Genus NOTIDANUS (Cuv.). (Sub-kingd. Vertebrata. Class Pisces. Order Plagiostomata. Section Selachoidei. Fam. Notidanidæ).

Gen. Char.—Only one dorsal fin, nearly opposite the anal ; no pit at the root of the caudal fin ; no nictitating membrane ; spiracles very small ; no labial fold ; mouth moderate ; gill-openings very large ; 6 (sub-genus *Hexanchus*), or 7 (sub-genus *Heptanchus*), teeth in the upper jaw, composed of usually 2 or 3 simple, narrow, pointed teeth in front, without cusps at base, behind which on each side are about 6 broad, obliquely-triangular, flattened teeth, usually the

anterior cusp of each of which is much the largest, with a variable number of much smaller cusps on the posterior edge; all the teeth of lower jaw broad, flattened, triangular, divided into numerous cusps, decreasing from the front to the hinder cusp, with the anterior edge usually serrated.]

Description.—Snout semi-elliptical, length rather less than half the distance between the anterior edge of orbits. Shape, elongate fusiform; the hinder edge of the dorsal fin extends slightly farther back than the vertical of the anterior edge of the anal fin. Caudal fin triangular at the tip, with a small notch at posterior end of narrow lower margin; anterior lobe moderate, triangular. *Color:* all the upper surface and fins of a greyish-ash color, the sides with a few small, whitish, round spots; belly whitish. *Teeth:* upper jaw, one small, narrow, pointed tooth in middle, and one larger, narrow, simple, slightly oblique on each side, behind which are 6 large, flat, obliquely-triangular teeth, the anterior cusp of each of which is very much larger than the others; the 1st tooth has 1 small, lateral, posterior cusp, the 2nd and 3rd have 2, the 4th and 5th have 3 or 4, gradually diminishing, small cusps on the posterior edge, the two hindmost teeth having 3 or 4 serratures on the base of the anterior margin, the anterior ones only 1 or 2. Lower jaw, with all the teeth large, flat, obliquely-subtrigonal, except the middle one, which, although broad and flat, is bifid, having 2 oblique, divaricating, principal cusps in the middle, with 3 or 4 gradually decreasing cusps on each side; the other teeth have the 1st cusp largest, with 3 or 4 gradually-decreasing to the posterior end, the anterior margin of each tooth serrated, with 3 or 4 small spines on the base.

Reference.—*Notidanus Indicus* (Cuv.), Reg. Anim.; = *Heptanchus Indicus*, Müll. and Henle, System. Besch. Plagiostom., p. 82, t. 32.

The following are the dimensions of the specimen figured:—

Measurements.	ft.	ins.	lines.
Length from tip of snout to distal end of caudal	8	1	0
„ „ „ anterior edge of orbit ...	0	5	3
„ „ „ anterior edge of pectoral ...	1	7	0
„ „ „ origin of dorsal	4	6	0
„ „ „ origin of ventral	3	10	0
„ „ „ origin of anal	5	1	6
„ from anterior edge of lower lobe of caudal fin to extremity of same lobe	0	8	6
„ from anterior edge of lower lobe of caudal fin to tip of tail	2	3	6
Girth in front of pectoral	3	1	0
Length from tip of snout to nostril	0	1	9
Vertical length of anterior gill-opening	0	8	0
„ length of posterior gill-opening	0	3	6
Antero-posterior length of the 7 gill-openings	0	6	6
Length from tip of snout to central tooth	0	4	0
„ of base of pectoral	0	7	3
„ of anterior edge of pectoral	0	10	6
„ of base of dorsal	0	8	3
„ of anterior edge of dorsal	0	6	3
„ of base of anal...	0	5	3
„ anterior edge of anal	0	4	3
„ middle tooth of upper jaw	0	0	3
Width at base	0	0	2
Length of 2nd sublunate tooth	0	0	5
Width at base...	0	0	3
Antero-posterior length of base of 3rd tooth	0	0	6
Height of principal cusp	0	0	7
Width of middle lower tooth	0	0	5
Height of middle lower tooth	0	0	4
Antero-posterior length of base of 2nd tooth	0	0	8
Height of principal cusp	0	0	5
Width between the orbits	0	7	0

A, middle tooth and teeth of one side of upper jaw.
B, middle tooth and teeth of one side of lower jaw, natural size.

The Sharks of this genus are easily distinguished from all others by having only one dorsal fin, and the peculiar conformation of the teeth, as well as the great size and number of the gill-openings. The present species belongs to the sub-genus *Heptanchus*, in which these reach the extraordinary number of 7, and it is distinguished from the other species of the sub-genus by having a single or odd, not oblique, central subulate tooth in each row in the middle of the upper jaw. As the peculiarities of the teeth are not quite distinct in the reduced figures on the plate, I give a view in the adjoining woodcut of the teeth of both jaws, natural size.

This is one of the rarer Sharks found in Hobson's Bay, from which locality there are three specimens in the Melbourne National Museum, the one above described being the largest of the three, and a female. A smaller male is in the collection, with moderate claspers.

EXPLANATION OF FIGURES.

PLATE 43.—Fig. 2, side view of female, reduced. Fig. 2*a*, front view of mouth, showing the dissimilarity of the upper and lower rows of teeth (the bifid apex of the centre lower tooth not sufficiently clear). Fig. 2*b*, side view of mouth. Fig. 2*c*, first broad lateral tooth of lower jaw, natural size. Fig. 2*d*, first lateral tooth of upper jaw, natural size.

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1b
1a
2.
1.
2c
2b
2a
1d
1c

PLATE 44, FIG. 1.

THERSITES ATUN (CUV.).

THE BARRACOUTA.

[Genus THERSITES (CUV. and VAL.). (Sub-kingd. Vertebrata. Class Pisces. Sub-class Teleostea. Order Acanthopterygia. Fam. Scomberidæ.)

Gen. Char.—Body long, slender; mouth deeply cleft; dorsals continuous; spines of moderate size; 2 to 6 finlets behind the dorsal and anal fins; greater part of body naked; no corset; no keel on tail; 7 branchiostegals; pyloric appendages moderate; an air-bladder. Teeth on the edges of the jaws of moderate size, conical, compressed, pointed, but a few very large on the intermaxillary bones.]

DESCRIPTION.—Body a little deeper than twice the height of dorsal fin, and rather more than one-eighth of total length, thickness about two-thirds of depth; head compressed, pointed, flat above, with straight profile and vertical sides, twice and one-eighth longer than high; lower jaw longer than upper one; length of head about four and a half in total length; mouth slit so that the slightly dilated end of the maxillary reaches to under anterior edge of orbit; eye about midway between tip of snout and edge of gill-cover, and near the upper edge of cheek. Lateral line with anterior part straight and near the dorsal until opposite 15th ray, then descending abruptly to near middle and continuing to tail with several large undulations. *Fins:* 1st dorsal, rays, 20; 2nd dorsal, 1 spinous and 10 soft; anal, 1 spinous and 10 soft; ventral, 1 spinous and 5 soft; 6 finlets above and below. *Teeth:* about 26 to 30 subequal, sharp, conical teeth on each side of upper jaw, the anterior smaller and not quite reaching the tip of the snout; with a row of fewer and larger ones in lower jaw; a median group of 4 or 5 large, strong, recurved, pointed teeth, six or eight times longer than the others, in the middle of the upper jaw, within the dentary edges; a row of about 7 very small equal teeth on each palate-bone. *Color:* back and top of head purplish-black; color and lustre of cheeks and rest of body and belly uniformly like polished lead; upper part of gill-cover darker; iris, pale golden-yellow; anterior dorsal fin with the rays whitish-yellow, the basal and anterior part of each membranous portion transparent and colorless, the posterior and upper portion blackish; posterior dorsal and finlets dirty-yellowish; pectoral and caudal fins dirty-brown, the middle of the caudal silvery; anal and ventral dirty-whitish.

The detailed measurements are as under:—

Measurements.	(A)	(B)	Approximate Proportional Measurements. (A)	(B)
	ft. ins. lines.	ins. lines.		
Length from snout* to distal end of middle of caudal ...	3 5 3	10 0	100	100
„ of caudal to middle	0 1 1	0 6	3	5
„ of caudal to end of lobes	0 5 0	1 5	12	14
„ from snout to anterior edge of orbit	0 3 9	1 0	9	5
„ of orbit	0 1 1	0 6	3	5
„ of head from snout to end of operculum	0 8 7	2 5	21	24

* The snout measurements are from the tip of upper jaw and not from the longer lower jaw.

Measurements—*continued.*

Measurements.	(A)	(B)	Approximate Proportional Measurement. (A)	(B)
	ft. ins. lines.	ins. lines.		
Length from snout to anus (measured along ventral edge)	2 4 0	6 7	67	66
„ from anus to end of middle of caudal	1 1 3	3 5	32	34
„ from snout to base of pectoral	0 8 6	2 6	21	25
„ from snout to origin of 1st dorsal	0 8 0	2 3	20	22
„ from snout to origin of 2nd dorsal	2 5 0	7 0	69	70
„ from snout to origin of ventral fin	0 8 9	2 9	22	28
„ of pectoral	0 3 3	0 11	8	9
Height of 1st dorsal	0 2 1	0 9	5	8
„ of 2nd dorsal	0 2 6	0 8½	6	8
Length of anal	0 2 9	0 11	7	9
Depth of anal	0 2 3	0 8	6	7
Length from base to tip of ventral fin	0 1 5	0 5	3	5
Width between eyes	0 1 7	0 5	4	5
Depth of body in front of ventral, about	0 5 0	1 5	12	14
Thickness of body in front of dorsal, about	0 4 0	0 9	10	8
Length of largest intermaxillary teeth	0 0 6	0 3	...	...
„ of largest teeth of upper jaw	0 0 1½	0 0½	...	...
„ of largest teeth on edge of lower jaw	0 0 2½	0 1	...	...

REFERENCE.—Cuv. & Val., Hist. Nat. des Poissons, vol. 8, t. 219.

There can be no doubt of the identity of our Australian Barracouta and that so abundant at the Cape of Good Hope; and Dr. Richardson's supposed *T. altivelis* must, I fancy, be founded on some mistake. The stomach usually contains many small fishes of its own and other species.

The Barracouta is a tolerably good fish for the table, and is abundant in the waters round the coast in all the colder months of the year.

EXPLANATION OF FIGURES.

PLATE 44.—Fig. 1, side view of moderate specimen, one-fifth of the natural size. Fig. 1*a*, inside of mouth, showing 2 rows of small palatine teeth, the row of larger teeth on edge of upper jaw not quite reaching the tip, and the small group of very large teeth in front. Fig. 1*b*, teeth of lower jaw, and tongue.

(N.B.—Figs. 1*c* and 1*d* are scales of the corslet, natural size and magnified, of the Tunny.)

PLATE 44, FIG. 2.

THYNNUS THYNNUS (LIN. SP.).

THE TUNNY.

[Genus THYNNUS (CUV.). Sub-kingd. Vertebrata. Class Pisces. Sub-Class Teleostea. Order Acantbopterygia. Fam. Scomberidæ).

Gen. Char.—Body thick, fusiform, tapering each way from about pectoral; 1st dorsal fin moderate, of rather small spines, reaching nearly or quite to 2nd dorsal; 6 to 9 finlets behind the dorsal and anal fins. Scales of the pectoral region larger than the others, forming a corslet. Jaws moderate with small teeth, and still smaller on the vomer and palatine bones. A longitudinal keel on middle of each side of the tail. Air-bladder simple or absent. Pyloric appendages numerous. Branchiostegal rays, 7. Open sea of tropical and temperate regions.]

DESCRIPTION.—*Fin-rays:* 1st dorsal of 13 to 15 spines, 1st longest; 2nd dorsal of 13 to 15 spines; 8 or 9 pinnulæ above and below; anal, 12 to 14; ventral, 6 to 7; pectoral, 30 to 34; caudal, about 18 rays above and below, with about 9 or 10 smaller ones in the middle. *Form:* Height of body and length of head almost equal, and less than $3\frac{1}{2}$ in total length to middle of posterior edge of caudal fin; pectoral reaching to vertical from 11th dorsal spine; body thick, fusiform, broad, ovate; greatest depth of body and length of head nearly equal; lower jaw slightly longer than the upper. *Teeth:* 30 to 36 teeth on edge of lower jaw, those on upper jaw smaller and more numerous; a band of 4 rows of very minute teeth on the palatine bone of each side; midline of vomer with still more minute teeth in many rows, forming a small, dilated, triangular patch in front. *Scales:* The large scales forming the corslet are not very distinctly distinguishable until the skin is dry; they occupy a space, the posterior boundary of which varies, but generally extending in a narrow strip backward along base of the dorsal fins, descending about opposite the middle of 1st dorsal, and then running back at an acute angle as far as the end of the 2nd dorsal, thence forward to below base of pectoral, which can be sunk in a depression fitting it. The scales of lateral line distinct from middle angle of corslet to ridge on side of tail, of larger and stronger scales than the body behind the corslet, each rotundato-quadrate, and with a prominent tubular keel; the line is slightly flexuous. Preoperculum with irregular longitudinal short grooves. *Color:* uniform purplish-black, with steel-blue reflections above; with brownish tinges on the top and sides of the head; belly and lower part of the sides silvery-white; fins dark brownish-purple, except the pectoral, which is black; finlets rich chrome-yellow, with a narrow, blackish margin; tongue and mouth black; iris golden-yellow on the outer margin, greenish and silvery towards inner edge.

REFERENCE. = *Scomber thynnus.* Lin., Syst. Nat., p. 493; = *Thynnus vulgaris,* Cuv. and Val., Hist. Pois., vol. 8, t. 210. Couch. Fish Brit. Is., vol. 2, p. 86, t. 82; = *T. Maccoyi* (Cast.), Proc. Zool. & Ac. Soc. Vict., v. 1, p. 104.

The following are the measurements of 5 specimens in the National Museum from the Victorian coasts, varying from 5 feet 10 inches to 18¼ inches in length :—

Measurements.	A.	B.	C.	D.	E.
	ft. ins. lines	ins. lines	ins. lines	ins. lines	ins. lines
Length from tip of snout to distal end of middle of caudal	5 10 0	33 9	32 9	25 6	18 3
„ from tip to tip of caudal	1 9 0	9 9	7 6	5 6	6 3
„ of lobes of caudal	1 2 0	6 6	6 3	4 9	3 6
„ of middle of caudal	0 3 0	1 3	1 3	0 11	0 7
„ from snout to anterior edge of orbit	0 7 0	3 6	3 6	2 9	1 11
„ of eye	0 2 3	1 6	1 6	1 3	0 11
„ of head to end of operculum	1 7 6	10 3	9 6	7 4	5 4
„ from snout to front of anal fin (measured along ventral edge)	3 6 0	20 6	20 6	16 9	11 6
„ from snout to base of pectoral	1 8 0	10 6	9 6	7 9	5 5
„ from snout to origin of 1st dorsal	1 9 0	11 0	11 6	8 3	6 1
„ from origin of 1st dorsal to origin of 2nd dorsal	1 3 0	8 6	7 6	6 0	4 6
„ from origin of 2nd dorsal to outer origin of caudal	2 3 0	13 0	12 9	9 0	7 5
„ of pectoral	0 11 0	6 3	6 6	4 9	3 3
„ of 1st dorsal	1 3 0	7 6	7 5	5 7	4 3
„ of 2nd dorsal	0 5 6	3 3	3 4	2 1	2 0
Space between dorsals	0 0 9	0 6	0 2	0 3	0 3
Length of anal	0 4 0	2 6	2 0	1 2	1 1
„ of ventral	0 2 3	1 5	1 0	0 7	0 9
„ from snout to base of ventral	1 9 0	10 9	10 3	8 6	6 3
Depth of body in front of dorsal	1 4 0	10 0	8 0?	6 0?	5 4?
Thickness of body in front of dorsal	1 1 6	8 0	5 6?	4 9?	4 0?
Height of 1st dorsal	0 7 0	3 6	2 9	2 6	2 0
„ of 2nd dorsal at highest anterior end	0 8 0	3 6	4 0	2 5	1 7
Depth of anal	0 8 0	3 6	3 6	2 1?	1 6
„ of ventral	0 6 9	3 3	3 3	2 6?	1 6?
Fin rays—					
1st dorsal	14	13	15	14	15
2nd dorsal	15?	15?	14?	13?	13?
Pinnules above	9	8	9	8	8
„ below	9	8	9	8	8
Pectoral	30?	34	32	32	32
Ventrals	6	7	6	6	6
Anal	12?	14?	12?	13?	13?
Caudal (20 from tip to tip, 9 or more shorter, above and below, outside)	58?	40?	$20\frac{3}{9}$	$20\frac{15}{13}$	$20\frac{15}{13}$

To give a clearer idea of the proportions indicated by the above measurements, they are approximately reduced in the following table to fractions of the total length, taking that in each case as 100. The near identity in most respects, and the comparatively smaller size of the eye and head in the largest specimen, will strike the attention at once in this way ; the latter being a general characteristic difference between old and young individuals to which I have often drawn attention in other fishes, where a neglect

of this generalization had erroneously suggested differences in species which were only due to age. This can be noted as varying thus from the smallest (the figured) specimen, marked E, to the largest, marked A. Also, I think, the depth of a fish varies so much by the different conditions of the abdomen from food, ova, &c., as to be an untrustworthy character. On similarly reducing the proportion of Cuvier's and Couch's original figures from fresh specimens, they are found to agree closely in most particulars of importance.

Proportional Size of parts in fractions of total length, taken as 100.	Proportions of Cuvier's Fig., Reg. Anim.	A.	B.	C.	D.	E.
Length from tip of snout to distal end of middle of caudal (as above)						
„ from tip to tip of caudal	30	30	29	23	22	35
„ of lobes of caudal	26	20	19	19	19	19
„ of middle of caudal	4	4	4	4	4	4
„ from snout to anterior edge of orbit ...	10	10	11	11	11	11
„ of eye	5	3	5	5	5	5
„ of head to end of operculum	27	27	30	29	29	29
„ from snout to front of anal fin (measured along ventral edge)	60	60	60	63	66	63
„ from snout to base of pectoral	28	28	31	29	30	29
„ from snout to origin of 1st dorsal ...	32	30	33	35	32	33
„ from origin of 1st dorsal to origin of 2nd dorsal	24	22	25	24	23	25
„ from origin of 2nd dorsal to outer origin of caudal	38	38	38	39	35	40
„ of pectoral	20	16	19	20	19	18
„ of 1st dorsal	23	22	22	22	22	23
„ of 2nd dorsal	9	...	...	...	...	...
Space betweeu dorsals	...	1	1	1	1	2
Length of anal	7	6	7	6	5	6
„ of ventral	3	4	5	4	3	4
„ from snout to base of ventral	29	30	32	32	33	34
Depth of body in front of dorsal	26	23	30	25?	24?	29?
Thickness of body in front of dorsal	...	14	24	17?	19?	22?
Height of 1st dorsal	14	10	10	9	10	11
„ of 2nd dorsal at highest anterior end ...	16	12	10	12	10	9
Depth of anal	16	12	10	11	8?	8
„ of ventral	15	8	10	10	10?	8?

The sides and belly in our specimens are uniform silvery and pearly white, without the mottling or spotting mentioned by Cuvier; and in this respect they agree with the descriptions taken from the life by Storer and Couch of American and English examples noted by them.

There is a small longitudinal keel on the tail above, and one below the larger keel, which smaller ones are only visible when

dry, and, as Couch observes, the second dorsal and anal fins are so thick when alive that it is very difficult to count the rays satisfactorily.

In different descriptions of this fish, the iris is said by some to be silvery, by others golden, and by others green ; the fact was seen to be, in our largest specimen (the eye of which was represented in a careful colored drawing while fresh), that the outer portion of the iris was rich, golden, brownish-yellow, the middle portion greenish, and the inner edge silvery.

I cannot doubt, after careful investigation, that the common Victorian Tunny (called Bonito erroneously by the colonists and fishermen), to which Count Castelnau assigned the name *Thynnus McCoyi*, as a new species, is really the common Tunny of European and American writers. By a slight error in the lithographing of our figure, the body seems to project at base of anal and 2nd dorsal fins, but, as above described, the fusiform outline is deepest under the 1st or 2nd spine of 1st dorsal, tapering thence gradually and regularly to the tail, and more rapidly to the snout. In stuffed or dried specimens of this, as in many other fishes, the under jaw seems considerably longer than the upper, with which it more nearly agrees in length when alive ; this arises from the shrinking of the soft portions between the several bones of the anterior part of snout above, while the more solid lower jaw retains its proper length more exactly.

The θύννος of Aristotle, and *Thynnus* of Pliny, ranging from the Mediterranean over the warm parts of the Atlantic, Pacific, and Indian Oceans, only rarely visits Victoria ; our specimens having all been obtained in the winter months of July or August. The largest specimen, from Portland, was presented by Mr. Goldstein, so well known for his microscopic researches on Polyzoa and other marine objects. On account perhaps of the beef-like redness of the flesh, it is not prized as food, and the fishermen here, as at home, note the greater heat of the body than in other fish, due to this condition of the muscles from the abundance of oxygenated blood.

It reaches 10 or even 20 feet in length in Europe and America, but our individuals are rarely more than 4 feet long, and must be

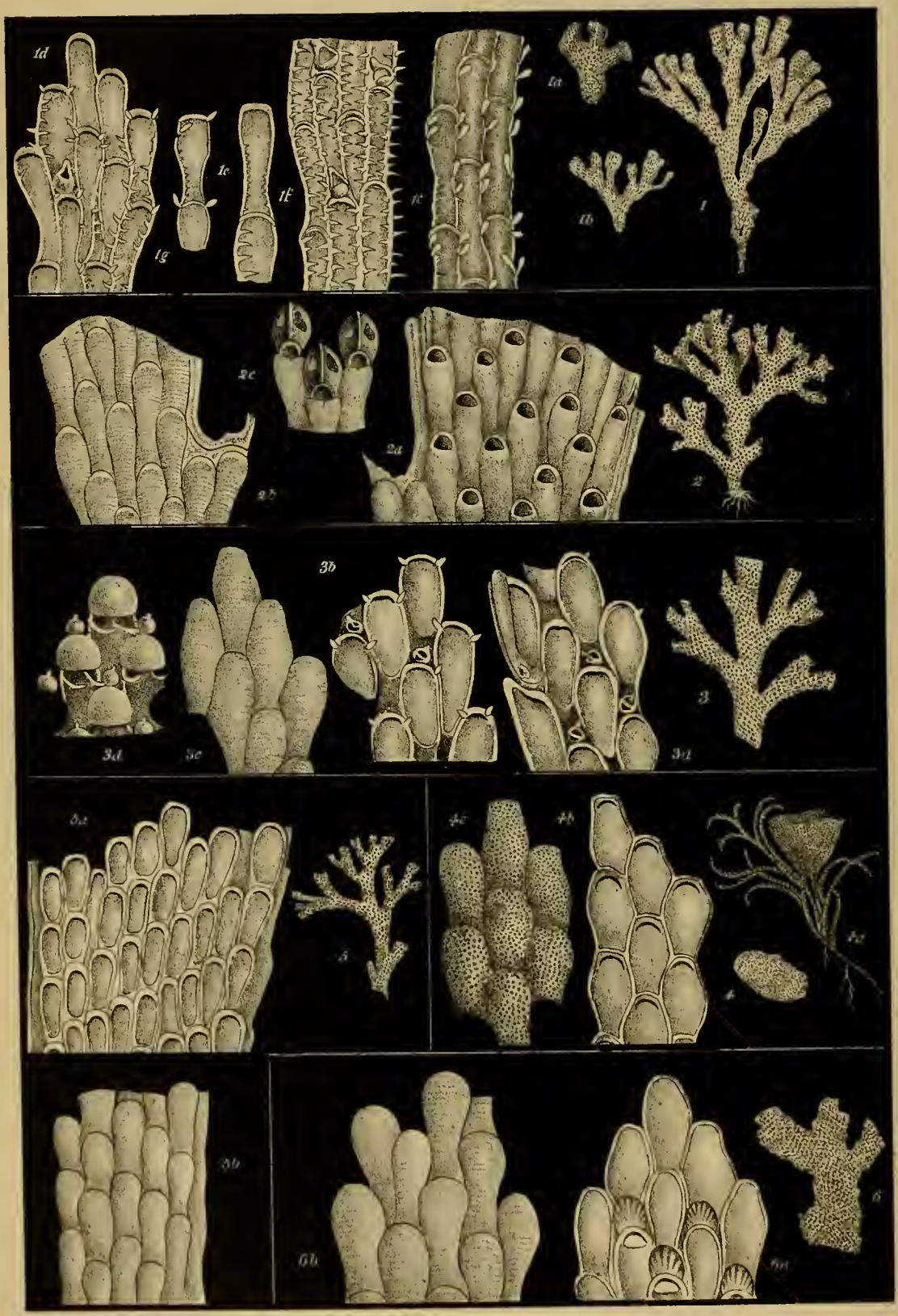
all young ; Belon's statement of one reaching 32 feet in length has not been parallelled in modern times, and is perhaps erroneous.

Of the above 5 specimens, the smallest, or figured one, was caught in Hobson's Bay, the largest at Portland, the next in size in Bass' Straits, the next at Queenscliff.

Explanation of Figures.

Plate 44.—Fig. 2, side view of small specimen, one-third the natural size (a little too protuberant at base of anal and 2nd dorsal fins). Figs. 2*a*, 2*b*, 2*c*, scales, natural size and magnified. Figs. 1*c* and 1*d*, scales of corslet, natural size and magnified.

Frederick McCoy.



Ripper lith
& Bartholomew lith

Prof. McCoy dirx.

Troedel & Co imp

PLATE 45, FIG. 1.

FLUSTRA DENTICULATA (BUSK).

[Genus FLUSTRA (LINN.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Flustridæ.)
Gen. Char.—Cells contiguous, on both sides of the polyzoary.]

DESCRIPTION.—Cells oblong, much elongated; a series of minute incurved denticles along the inner edge of the margin; avicularium large, at the base of a cell, mandible pointed, oblique.
REFERENCE.—Busk, Voy. Ratt., i., 380; Cat. Mar. Pol. Brit. Mus., 49, t. lvi., fig. 7, t. lvii., and t. l., figs. 3 and 4.

Queenscliff and other places.

A very variable species, the only constant character being the minute denticles within the inner edge of the margin of the cells. These can always be detected in some of the younger cells towards the end or sides of the branches. Usually, in addition to the denticles, there is a series of thick, hollow, pointed or blunt processes projecting from the front of the cell margins. These vary much in number, sometimes being only one on each side of the mouth, sometimes two, and frequently a series extending along the whole length of the cell. They are occasionally dentate or bifurcate. The branches of the polyzoary are generally elongated, strap-shaped, dichotomously branched, truncated at the ends. In other specimens they are much broader, more irregularly branched, and rounded at the ends. In a few, the calcareous matter is very deficient, and the frond is so membranous as to present much the color and appearance of a *Carbasea*.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 1, ordinary specimen, natural size. Fig. 1*a*, broader form, natural size. Fig. 1*b*, membranous form, natural size. Fig. 1*c*, portion of fig. 1, magnified, showing two blunt processes on each side of the mouth. Fig. 1*f*, portion of fig. 1*a*, magnified, showiog a series of large pointed processes along the margins of tbe cells. Fig. 1*e*, cell from near the end of the same specimen, to show the minute sub-marginal denticles. Fig. 1*d*, portion of fig. 1*b*. Fig. 1*g*, cell towards edge of same, showing the sub-marginal denticles.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

PLATE 45, FIG. 2.

CARBASEA EPISCOPALIS (BUSK).

[Genus CARBASEA (GRAY). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-order Cheilostomata. Fam. Flustridæ.)
Gen. Char.—Polyzoary expanded, foliaceous ; cells contiguous, on one side only.]

DESCRIPTION.—Cells elongated, more or less cylindrical, contracted below, transversely rugose behind; aperture small. Ovicells mitriform, with a vertical ridge down the centre, and a large opening on each side.
REFERENCE.—Busk, Voy. Ratt., i., 379; Cat. Mar. Pol. Brit. Mus., p. 52, t. xlviii., figs. 1 and 2; t. lv., fig. 3.

Queenscliff ; Kings Island, Mr. McGowan.

At once distinguished by the attenuated, cylindrical cells, with the small rounded apertures. The ovicells are very peculiar, presenting a curious resemblance to a bishop's mitre. The polyzoary is dichotomously divided, 2 or 3 inches high, the branches narrow and delicate.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 2, specimen, natural size. Fig. 2*a*, portion, magnified, showing the front of the cells. Fig. 2*b*, portion of back, magnified. Fig. 2*c*, ovicells, magnified.

PLATE 45, FIG. 3.

CARBASEA DISSIMILIS (BUSK).

DESCRIPTION.—Cells in front pyriform, only a small portion inferiorly filled in; the marginal cells obliquely truncated above, and with the upper and outer angle produced into a blunt spine, which projects beyond the base of the cell next above ; the cells sometimes unarmed, frequently, especially towards the centre, with a short spine at each upper angle. Avicularia small, at the base of a cell. Ovicell rounded above.
REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 51, t. xlix., figs. 4, 5, 6, 7.

Queenscliff; Kings Island, Mr. McGowan.

This is readily distinguished from the other species by the projecting outer angle of the marginal cells. The presence of a small avicularium at the base of most of the cells is also very characteristic. Some of the cells are unarmed, and others have a small short spine at each upper angle. The ovicells are prominent, round above, smooth. Each ovicelligerous cell has a long hollow process on each side, curved inwards and upwards, which, with the avicularium on the cell above, give a very peculiar appearance.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 3, specimen, natural size. Fig. 3*a*, front, magnified, to show projecting upper angles of marginal cells and avicularia at base of other cells. Fig. 3*b*, cells from same specimen, showing small spines at upper angles. Fig. 3*c*, back of some cells. Fig. 3*d*, ovicells, showing also the long curved processes of the ovicelligerous cells and the avicularia at the base of the cells above. (The mandible not satisfactorily shown.)

PLATE 45, FIG. 4.

CARBASEA INDIVISA (BUSK).

DESCRIPTION.—Cells broad, oblong or obscurely hexagonal, entirely open in front, minutely granular behind. Polyzoary undivided, expanding above, frequently involute, and with the edges united so as to form a more or less perfect cup.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 53, t. lviii., 3 and 4; *Carbasea cyathiformis*, P. MacGillivray, Trans. Phil. Instit. Vict., 1859.

Queenscliff; Warrnambool, Mr. Watts; Cape Otway, Mr. J. Payter; Portland, Mr. Maplestone.

This species differs from the other *Carbaseæ* in the polyzoary being undivided. In almost all the specimens I have seen, the lateral margins are more or less involute and united inferiorly. It is frequently cup-shaped (var. *cyathiformis*), of which a very beautiful specimen is figured.

EXPLANATION OF FIGURES.

PLATE 45.—Fig 4, specimen, natural size. Fig. 4*a*, var. *cyathiformis*, natural size. Fig. 4*b*, front of cells, magnified. Fig. 4*c*, back of cells, magnified.

PLATE 45, FIG. 5.

CARBASEA ELEGANS (BUSK).

DESCRIPTION.—Cells oblong, truncate above and below, slightly filled in below. Cells behind oblong, smooth.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 53, t. lv., figs. 6 and 7; t. lvi., fig. 3.

Queenscliff; Portland, Mr. Maplestone.

A delicate species, forming tufts closely resembling those of *C. episcopalis*, from which, however, it totally differs in the character of the cells. In the specimen figured, the cells were in very distinct oblique lines; usually they are regularly alternate, as in the back view.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 5, specimen, natural size. Fig. 5*a*, front of branch, magnified. Fig. 5*b*, back, magnified.

PLATE 45, FIG. 6.

CARBASEA PISCIFORMIS (BUSK).

DESCRIPTION.—Cells entirely open in front, pyriform, frequently slightly expanded below; oblong behind, and contracted in the middle. Ovicells marked with radiating lines.

REFERENCE.—Busk, Cat. Mar. Pol. Brit. Mus., p. 50, t. lv., 1, 2; and t. lvi., fig. 6.

Queenscliff; Portland, Mr. Maplestone.

In this species the branches are not much divided, and they are shorter, broader, and more rounded than in the others.

EXPLANATION OF FIGURES.

PLATE 45.—Fig. 6, specimen, natural size. Fig. 6*a*, front of branch, showing also the ovicells, magnified. Fig. 6*b*, back of cells, magnified.

The Flustra and Carbaseæ on this plate have been presented to the National Museum with the above descriptions by Mr. MacGillivray.

FREDERICK McCOY.

1
1a
1b
2a
2b
2
3a
3b
4a
4
4b
5a
5b
5
6a
6
7a
7b
7

PLATE 46, FIG. 1.

SPIRALARIA FLOREA (BUSK).

[Genus SPIRALARIA (BUSK). Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Flustridæ.)

Gen. Char.—Polyzoary, a narrow and ribbon-shaped lamina spirally twisted round an imaginary axis. Cells in a single layer, opening on the inner surface.]

DESCRIPTION.—The only species.

REFERENCE.—Busk, Mic. Journ., vol. i., new ser., p. 153.

Queenscliff and other localities ; not uncommon.

This beautiful species forms tufts from 1 to 3 or 4 inches high. It consists of a narrow lamina, spirally twisted round an imaginary axis. The branches spring from the margin of the lamina, are from a quarter of an inch to an inch and a half in length, and are usually attenuated at either end. The cells are arranged in a single layer, opening on the inner or upper surface of the lamina. They are irregularly ovoid, generally much narrowed below, separated by raised margins, along each side of which is a row of minute aculeate spines or denticles. The mouth is shallow, wide, arched above, straight or hollowed below. At one side of the mouth there is a digitiform or club-shaped blunt process. The back of the lamina is marked by narrow raised lines running from the base to the margin, and connected by similar cross ribs. These divide the surface into narrow oblong spaces, having no relation to the true cells, than which they are much smaller. There are two forms of avicularia. All the complete cells at the margin are terminated by sessile avicularia. These are very large, occupying the whole width of the cells, and projecting beyond the free edge of the lamina. The mandibles all open towards the same side. There are other smaller sessile avicularia situated on the front of many of the cells. In some specimens those on the cells approaching the margin are larger, and approximate in structure and size to the large projecting terminal ones.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 1, specimen, natural size. Fig. 1*a*, a small portion of the inner or upper surface of the lamina magnified. Fig. 1*b*, back of the same, showing the division by narrow raised lines into oblong spaces.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

PLATE 46, FIG. 2.

DIACHORIS MAGELLANICA (BUSK).

[Genus DIACHORIS (BUSK). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Flustridæ.)
Gen. Char.—Polyzoary erect or decumbent. Cells disposed in a single layer, disjunct, each connected with 6 others by regularly arranged tubes.]

DESCRIPTION.—Cells remote, boat-shaped, semi-erect; mouth arched above and straight or hollowed below, with a slightly thickened rim; margin unarmed. A capitate avicularium on each side above, directed nearly vertically, and opening horizontally forwards.
REFERENCE.—Busk, Voy. Ratt., i., 382; Cat. Mar. Pol. Brit. Mus., p. 54, pl. lxvii., figs. 1, 2.

Portland, Mr. Maplestone.

D. Crotali, of which I have specimens, but not received in time for illustration in the present plate, is distinguished by the different form of the avicularium, which is represented by a lanceolate process without any mandible.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 2, specimen, natural size. Fig. 2*a*, small portion, magnified, showing the front of the cells. Fig. 2*b*, the same, viewed from behind.

PLATE 46, FIG. 3.

DIACHORIS SPINIGERA (P. MACGIL.).

DESCRIPTION.—Cells elongate-oval; 2 or 3 long, straight spines springing from the margin above, and a series, usually about 5, of long slender incurved spines arising from the margin on either side. A large pedunculate avicularium on one side near the mouth.
REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1859.

Queenscliff; Wilson's Promontory, Baron von Mueller; Portland, Mr. Maplestone.

Busk's *D. costata*, of which I have recently received beautiful specimens dredged at Queenscliff by Mr. J. B. Wilson, differs in its smaller size and greater number and length of the spines, which extend more than half way across the apertures, those of opposite sides interdigitating.

Explanation of Figures.

Plate 46.—Fig. 3, specimen, natural size. Fig. 3*a*, front view of cells, magnified. Fig. 3*b*, back view of same.

Plate 46, Fig. 4.

DIMETOPIA SPICATA (Busk).

[Genus DIMETOPIA (Busk). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Gemellariidæ.]

Gen. Char.—Cells joined back to back; each pair arising from the next below, and placed at right angles to it. Cells of the pair at a bifurcation disjunct, and each giving origin to the first pair of a branch.]

Description.—Cells funnel-shaped, contracted below, expanded above. Aperture nearly horizontal or oblique, margin slightly thickened and occupied by a series of stout articulated spines. Ovicell rounded, situated at the upper and inner part of the cell, and projecting above the aperture.

Reference.—Busk, Voy. Ratt., i., p. 384; Cat. Mar. Pol. Brit. Mus., p. 35, pl. xxix., fig. 1.

Queenscliff; Cape Otway; Portland, Mr. Maplestone; not uncommon.

Forms handsome, dense, whitish tufts, 1 to 2 inches high. The cells are of considerable size, infundibulate. The aperture is nearly horizontal, or sloping obliquely outwards and downwards; its margin is occupied by a thickened band, and has a series of usually 4 or more articulated spines; of these, the outer or median is frequently much larger than the others. The ovicell is rounded or ovoid, and situated above and to the inner side of the aperture.

Explanation of Figures.

Plate 46.—Fig. 4, specimen, natural size. Fig. 4*a*, portion, magnified. Fig. 4*b*, small portion, to show the ovicells.

PLATE 46, FIG. 5.

DIMETOPIA CORNUTA (BUSK).

DESCRIPTION.—Cells with the aperture very oblique, wider above and nearly triangular; margin thickened, with a spine at each upper angle and 1 or occasionally 2 at the lower. Ovicells nearly globular, above and to the inner side of the aperture.

REFERENCE.—Busk, Voy. Ratt., i., p. 384; Cat. Mar. Pol. Brit. Mus., p. 35, pl. xxix., figs. 2, 3.

Queenscliff; Sealer's Cove, Baron von Mueller; Portland, Mr. Maplestone.

This is of considerably smaller size than the last species. The cells are much smaller; the opening is very oblique, and much wider above; the margin is thickened, but not with the same deep band as in *D. spicata*, and there are usually 3 spines, 1 from each angle superiorly, and 1, or occasionally 2, from the middle in front. The ovicell is small, round, and situated above and to the inner side of the aperture.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 5, specimen, natural size. Fig. 5*a*, portion, magnified. Fig. 5*b*, small portion, showing an ovicell.

PLATE 46, FIG. 6.

DIDYMIA SIMPLEX (BUSK).

[Genus DIDYMIA (BUSK). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Gemellariidæ.)

Gen. Char.—Cells joined side to side, all facing the same way, each pair arising from the pair next below it; aperture large, wholly anterior; at a bifurcation cells not disjunct, and each giving origin to a pair.]

DESCRIPTION.—The only species.

REFERENCE.—Busk, Voy. Ratt., p. 383; Cat. Mar. Pol. Brit. Mus., p. 35, pl. xxxix.

Queenscliff; Portland, Mr. Maplestone.

Forms handsome, whitish, or brownish-white curling tufts. The cells are very large, with a thick margin, the upper and outer angles of which form sharp conical processes ; mouth arched above and straight below. The ovicells are very peculiarly situated. At certain bifurcations, a cell is intercalated between the two ordinary ones of a pair ; it is pyriform and slightly anterior, with the upper extremity produced into a process directed upwards and forwards ; the large mouth is situated at or below the middle of the cell, and in a separate compartment above this the large rounded ovicell is seen through the membrane.

Additional view of ovicell of *D. simplex*, as shading of plate is indistinct.

Explanation of Figures.

Plate 46.—Fig. 6, specimen, of natural size. Fig. 6*a*, portion, magnified, showing arrangement of cells, bifurcation, and ovicells.

Plate 46, Fig. 7.

CALWELLIA BICORNIS (Wyv. Thomson).

[Genus CALWELLIA (Wyv. Thomson). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Gemellariidæ.)

Gen. Char.—Cells joined back to back, each pair at right angles to those above and below ; the cells of each pair connected by tubes with the pair next but one below ; cells at a bifurcation not disjunct, and each giving origin to the first pair of a branch.]

Description.—The only species.

Reference.—Wyville Thomson, Dublin Natural Hist. Review, April 1858.

Queenscliff.

Of this species, I have only seen a few small fragments growing on other polyzoa, and it was difficult to find a portion sufficiently perfect for illustration. The connection of the cells is very peculiar, and is similar to what occurs in the European *Notamia bursaria*. Each pair of cells is connected with the next but one below by tubes, which pass round and in the hollow between the cells of the

intermediate pair. The mouth is nearly horizontal, and on each side of it the cell is produced into a thick, conical, hollow process. The small round ovicells are situated above and behind the aperture. In some specimens the ovicells are smooth, in others they are more or less distinctly marked like a miniature Clam-shell, as described and figured by Thomson. It is quite possible that there may be more than one species, but the specimens in my possession are not sufficiently perfect to enable me to say with certainty.

EXPLANATION OF FIGURES.

PLATE 46.—Fig. 7, specimen, natural size. Fig. 7*a*, portion, magnified; the lower part has been a little twisted. Fig. 7*b*, showing two ovicells. The specimen was not sufficiently perfect to show the markings described by Thomson.

The descriptions and specimens of the Polyzoa on this plate have been contributed to this work and the National Museum by my friend Mr. McGillivray.

FREDERICK McCOY.

Polyzoa

= Adeona

Busseler 53: 9213

PLATE 47, FIG. 1.

DICTYOPORA CELLULOSA (P. MACGIL.).

[Genus DICTYOPORA (P. MACGIL.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Escharidæ.)
Gen. Char—Polyzoary stony, expanded, foliaceous, fenestrate, articulated by a flexible stem; cells horizontal, opening on both sides.]

DESCRIPTION.—Polyzoary expanded, proliferous, and cavernous; fenestræ round, narrower than the interspaces; cells distinct, mouth nearly circular; a large avicularium on the front of each cell below the mouth, with the mandible pointed obliquely upwards and outwards.
REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff.

Of this handsome species, the largest specimen I have seen is the one figured, which is 9 inches high by 16 in circumference at its thickest part. In young specimens the color is deep brown, but this becomes much lighter with age. The flexible stem by which the polyzoary is attached is short, and is marked by narrow, transverse, broken, coriaceous ridges, which are joined by masses of short, tubular, vertical fibres. In old specimens the stem becomes more rigid, from the deposit of calcareous matter. The polyzoary is expanded, foliaceous, proliferous, and variously twisted to form a cavernous mass like a large Retepore. The cells are distinct, with a small circular mouth, with a thickened margin. The avicularia are very large, usually on the front and side of the cell, pointed obliquely upwards and outwards, and with the mandible reaching to opposite the middle of the cell-mouth. At the lower part of the polyzoary the surface is occasionally elevated into obscure rounded ridges, extending for a short distance upwards. The fenestræ are round, variable in size, but always narrower than the interspaces. The size of the compartment formed by the twisting and junction of the lamina varies, in some specimens the polyzoary being flatter and with very few divisions.

Lamouroux founded the genus *Adeona* to contain two Australian zoophytes, characterised by the stony expanded frond being sup-

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

ported by a flexible stem. One species, *A. foliacea*, Lamx. (*A. foliifera*, Lamck.) is described as entire, and the other, *A. grisea*, Lamx. (*A. cribriformis*, Lamck.), as cribriform, or perforated by round foramina. These two forms ought evidently to be referred to distinct genera, and the latter would come under the present genus. Adopting the name *Dictyopora* for the fenestrate species, the generic name *Adeona* might be retained for the species with the polyzoary entire.

Since the above description was written, I have received, through the courtesy of the author, an early copy of a valuable memoir on *Adeona* by Dr. Kirchenpauer of Hamburg. He describes eight species, and considers that one (*A. intermedia*) shows the transition between the entire and the fenestrated forms, and therefore combines them all in the same genus. From an examination of his description and figures, I am, however, unable to agree with him, as it seems to me that the fenestræ of *A. intermedia* are merely formed by the accidental and irregular overlapping and coalescence of the branches, and that the structure is essentially different from what occurs in the regularly fenestrate species. A similar irregular inosculation occasionally takes place in Eschara, and is shown in *E. platalea*, plate 48, fig. 4, of the present Decade.

Mr. J. B. Wilson has recently presented to the Museum specimens of *D.* (*Adeona*) *grisea*, and another species which seems to be identical with Kirchenpauer's *Adeona albida*. They were dredged off Queenscliff, and will shortly be described and figured.

Explanation of Figures.

Plate 47.—Fig. 1, specimen, natural size. Fig. 1*a*, small group of cells, magnified. Fig. 1*b*, two cells, more highly magnified. Fig. 1*c*, two old cells, denuded of ectoderm, magnified to the same extent as the last figure. Fig. 1*d*, section, showing the cells arranged in a double layer.

Fine specimens of this grand form have been presented to the Museum with the above description by the discoverer, Mr. McGillivray.

Frederick McCoy.

. obliqua

2
2b
2d
1a
1
1b
6a
6
6c
6b
3b
3a
3
3c
4
4c
4b
4a
7c
7
7b
7a
7d
5d
5
8d
8c
8b
8a
0.01 In.

PLATE 48, FIG. 1.

ESCHARA OBLIQUA (P. MACGIL.).

[Genus ESCHARA (RAY). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Escharidæ.)

Gen. Char.—Polyzoary foliaceous or lobed, not perforated. Cells with the walls complete in front, opening on both surfaces, coalescent, placed back to back, and horizontal to the plane of the axis.]

DESCRIPTION.—Polyzoary foliaceous ; cells obliquely rhomboidal, separated by raised smooth lines; surface tubercular and perforated ; mouth arched above, with a considerable sinus in the lower lip. Ovicell large, granular, and perforated, and traversed by smooth raised lines like those separating the cells.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Schnapper Point ; a single specimen.

In the only specimen I have seen, the cells form series in an arched direction laterally. They are mostly obliquely rhomboidal, with the mouth in the upper angle ; the surface is tubercular, with numerous small perforations among the tubercles. The ovicells are large, spreading over more than one cell, and with raised lines, marking the limits of the cells beneath. The mouth of the ovicelligerous cell is much wider, and the sinus in the lower lip much shallower.

EXPLANATION OF FIGURES.

PLATE 48.—Fig. 1, specimen, natural size. Fig. 1*a*, portion, magnified. Fig. 1*b*, two cells and outline of another, more highly magnified; in one cell the mouth is obliterated by the deposition of calcareous matter.

PLATE 48, FIG. 2.

ESCHARA DISPAR (P. MACGIL.).

DESCRIPTION.—Polyzoary small, divided into thick lobes; cells immersed, slightly projecting, and rounded above; mouth lofty, projecting, and spout-like above, with a sinus below. An avicularium on one side of the mouth, with the acute mandible pointed upwards.

REFERENCE.—P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

Queenscliff.

I have only seen a single small perfect specimen of this species. It is divided into short, thick, branched lobes. The cells are immersed, the upper part convex and bulging forwards ; the mouth is lofty, arched, the upper part much deeper and spout-like, in consequence of the bulging forwards of that part of the cell The lower lip has a deep sinus. The cells are wholly or partially separated by fine faintly raised lines. The surface is faintly granular, some of the cells having a few slightly projecting elevations round the mouth, and many of the old cells towards the base being areolated. The cells at the apex of the lobes have no avicularia ; most of the others have one below and to the side of the mouth, with the long pointed mandible directed upwards. Towards the base of the polyzoary the cells are indistinct, deeply areolated, no mouths in some parts apparent, but only a few scattered avicularia. This change is due to the increased deposition of calcareous matter in the older cells as takes place in other stony Escharæ.

Explanation of Figures.

Plate 48.—Fig. 2, specimen, natural size. Fig. 2*a*, portion, magnified. Fig. 2*b*, a few cells, more highly magnified, to show the form of the mouth and the situation and form of the avicularia.

Plate 48, Fig. 3.

ESCHARA GRACILIS (Lamx.).

Description.—Polyzoary forming thick, narrow, rounded, branches; cells deeply immersed, bulging above; mouth rounded, with a thickened lip, and frequently a projecting process or denticle inside the lower lip; a round pore on the front of the cell below the mouth. Avicularia small, broad, with a short rounded mandible. Ovicells immersed.

Reference.—Busk, Cat. Mar. Pol. Brit. Mus., p. 91, t. cviii., figs. 5, 6, 7.

Queenscliff.

The only specimen I have seen is the one figured. The cells are immersed and indistinct. The surface is marked with close

areolations ; at the growing apex these are seen to be the openings of close-set tubes, which give that part of the polyzoary a spongy or honeycomb appearance ; further towards the base they become filled with calcareous matter. In some cells there are one or more rounded elevations in the neighborhood of the mouth ; these are plain, or have what seems to be an avicularium on the side of the apex. In almost all the cells there is a round pore below the mouth. The avicularia are very small, short, and broad, and are usually situated on the interstices between the cells or on the prominences round the mouth. The ovicells are deeply immersed, indistinguishable from the other cells except for the larger projection upwards.

Explanation of Figures.

Plate 48.—Fig. 3, specimen, natural size. Fig. 3*a*, a portion, magnified, showing the ovicells at the upper part. Fig. 3*b*, single cell and ovicell, more highly magnified, showing also the minute avicularia. Fig. 3*c*, part of a young cell, showing the mouth and elevations surrounding it, on the outer part of several of which is what seems to be a small avicularium.

Plate 48, Fig. 4.

ESCHARA PLATALEA (Busk).

Description.—Polyzoary dividing into flat, thick lobes, branching and sometimes anastomosing; cells ovate; mouth arched above, straight below; a simple, round pore in a depressed area below the mouth. Avicularia of two sorts: small, and usually situated below the mouth and to one side, or replacing a cell, very large, and with a long, spatulate mandible.

Reference.—Busk, Cat. Mar. Pol. Brit. Mus., p. 90, t. cv., figs. 1, 2, 3; cviii., fig. 4.

Queenscliff.

In this species the polyzoary is stony, disposed in flat lobulated branches, which sometimes anastomose together so as to leave linear or elliptical foramina. The junctions of the branches can be readily distinguished, and they frequently overlap. The cells are usually ovate. The mouth is rounded above, and straight or rounded below. There is generally a simple round pore at the bottom of a depression below the mouth. The surface is smooth, granular, or

areolated. The cells at the margins of the foramina are generally considerably larger. In one specimen, those on the extreme growing edge are perforated or fenestrate, and without the suboral pore ; those adjoining, however, present the usual structure. As in other Escharæ, the openings of the cells towards the base of the polzyoary become overgrown. The avicularia are of two sorts. In many cells there is a small avicularium, on one or both sides, below the mouth, with the pointed mandible directed more or less outwards. The other avicularia are very large, and take the place of a cell. In them the mandible is spoon-shaped, and of enormous size. They frequently occur grouped two or three together, and in the specimen figured are especially abundant at the edges of the openings formed by the anastomoses of the branches. In some of these the mandible is shorter and occasionally pointed, and the supporting basis is very prominent when seen in profile.

E. platalea is distinguished from the other Victorian stony species with which I am acquainted by the narrow, flat, anastomosing lobes, the simple suboral pore, the size and shape of the large, scattered, spoon-shaped avicularia, and the situation of the small ones on the front of the cells.

Explanation of Figures.

Plate 48.—Fig. 4, specimen, natural size. Fig. 4*a*, portion, magnified. Fig. 4*b*, cluster of cells, more highly magnified, showing the small avicularia and a single, large, spatulate one. Fig. 4*c*, small group, to show 2 large cells towards the edge of a lobe and a smaller one to the side.

Plate 48, Fig. 5.

ESCHARA QUADRATA (P. MacGil.).

Description.—Polyzoary expanded, foliaceous, convoluted; cells quadrate, separated by narrow raised lines and arranged in longitudinal linear series; surface granular and perforated; mouth arched above, lower lip arched upwards and projecting, a minute, curved denticle sometimes on each side of the mouth immediately above the angles. Avicularia, when present, situated at the side of the mouth. Ovicell large, granular, with lines on the surface similar to those separating the cells.

Reference.—*Eschara elegans*, P. H. MacGillivray (not Milne Edwards), Trans. Roy. Soc. Vict., 1868.

Queenscliff ; Portland.

The only Victorian species at all resembling this is *E. obliqua*, the polyzoary of which is thicker. The situation and form of the mouth also, as well as the shape of the cells, are different. The avicularia are very rare ; they are small, short, broad, and situated on each side below the mouth, directed downwards ; they seem to be more frequently present on the cells supporting the ovicells. The ovicells are similar to those of *E. obliqua*, and, like them, are traversed by raised lines.

EXPLANATION OF FIGURES.

PLATE 48.—Fig. 5, specimen, natural size. Fig. 5*a*, portion, magnified ; two avicularia are shown on the cell supporting the ovicell (they should appear more distinct from the raised margin, with a downward direction).

PLATE 48, FIGS. 6 AND 7.

ESCHARA MUCRONATA (P. MACGIL.).

DESCRIPTION.—Polyzoary stony, expanded, laminate or lobed ; cells ovate, with a stellate pore or group of pores in the middle; mouth rounded above. An avicularium below the mouth, the mandible directed vertically upwards, and the beak usually projecting above the lower lip.

REFERENCE.—*Lepralia mucronata,* P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff and Schnapper Point.

What may be taken as the typical young cell of this species is ovoid, smooth, or minutely granular. There is a vertical avicularium immediately below the mouth, the mandible pointing directly upwards, and the beak very calcareous and frequently projecting as a mucro over the edge of the lower lip, with which it is incorporated. There is a small, round group of stellate pores on the middle of the cell. The cells are indistinct, or separated by fine lines. In some of the small cells there is a series of perforations along the edge. In older specimens, and removed from the growing edge, the cells become much altered, principally by the deposition of

calcareous matter. This frequently accumulates largely round the suboral avicularium, in an agglomeration above the mouth, and in rounded elevations along the sides of the cells. In those cells there are usually several round perforations on the outer edges of the lateral nodules. The cells are also separated by distinct raised lines. In some specimens a certain number of cells, frequently grouped in close proximity, are very much larger. These large cells differ also in having the mouth much wider and shallower, and in the stellate pores not being confined to a small group, but being more numerous and scattered over the whole of the central part of the cell. They are frequently covered with rounded calcareous masses along, but separated from, the edges, similar masses being heaped up about the avicularium, which is sometimes completely obscured by them, and also above the mouth. It is difficult to say what these cells are, unless they are connected with the ovicells. Besides the suboral, vertical avicularia, there are, in some specimens, a few others very large and taking the place of cells, as happens in *E. platalea.* The mandible is large and triangular. They are mostly situated among the calcareous cells, and their basis assumes the same appearance.

E. mucronata may be always distinguished by the vertical suboral avicularium and the central group of stellate pores.

Explanation of Figures.

Plate 48.—Fig. 6, the specimen described as *Lepralia mucronata*, natural size. Fig. 6*a*, a portion of the same, magnified. Fig. 6*b*, a few cells, more highly magnified, showing the simplest form. Fig. 6*c*, cells from the same specimen, showing the perforated margin.

Fig. 7, another specimen, natural size. Fig. 7*a*, a portion, magnified (the same extent as 6*b* and 6*c*), showing a large solitary avicularium ; the cells are unusually large, and the upper one approaches the characters of the very large ones. Fig. 7*b*, small group, to show two of the very large cells ; in these there is a large deposit of calcareous matter obscuring the suboral avicularium ; the wide mouth and scattered pores are shown ; the smaller cells show the accumulation of calcareous matter about the avicularium, which in the lowest is completely covered over. Fig. 7*c*, cells from another large specimen ; in many cells of this it was difficult to make out with certainty the stellate pores, owing seemingly to the presence of epidermis, but in a considerable number they were quite apparent as figured ; throughout, the calcareous matter was mostly accumulated on the avicularia and above the mouth. Fig. 7*d*, a separate avicularium from the same specimen, showing an increased deposit of calcareous matter.

PLATE 48, FIG. 8.

CALESCHARA DENTICULATA (P. MACGIL.).

[Genus CALESCHARA (P. MACGIL.). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Ord. Cheilostomata. Fam. Escharidæ.)

Gen. Char.—Polyzoary expanded, foliaceous, erect, not perforated. Cells horizontal, opening on both surfaces, separated by raised lines, and depressed in the centre. Front calcareous, except a small part anteriorly, which is membranous.]

DESCRIPTION.—Polyzoary small, foliaceous, convoluted. The cells are wide and rounded above, contracted below, separated by raised, smooth, or minutely crenulated margins. The front is depressed in the centre, and is covered by a membrane, through which the deeper calcareous layer may be obscurely seen. When this is removed, as it frequently is by attrition or decay, the edges are seen to be bevelled inwards, and about a sixth or a fourth part of the front within the bevelled portion is entirely membranous; the arched mouth is situated at the upper part of this. The rest of the front is calcareous, except a large slit on each side. At the junction of the membranous anterior part there is an increased deposit of calcareous matter, forming a thickened convex band, the anterior edge of which is smooth or finely denticulate, or tubercular. The outer edge of the slit-like opening corresponds to the inner bevelled margin. It is granular, like the bevelled part. The inner edge is produced into a series of minute, pointed, horizontal denticles. The lamina between the slits slopes backwards on each side, and is occupied by numerous pores or small tubercles. In some cells there is a small, rounded prominence in the angle above the mouth which might be mistaken for a minute ovicell. The ovicelligerous cell is very large, and the ovicell is wide, little projecting, and incorporated with the cell above, which also is of unusual size.

REFERENCE.—*Eschara denticulata*, P. H. MacGillivray, Trans. Roy. Soc. Vict., 1869.

Queenscliff; Schnapper Point; Warrnambool, Mr. Watts.

This differs from the old genus Eschara in the anterior part of the cell being membranous, and the front depressed in the centre. The membranous part varies considerably in extent, and in some cells the mouth seems to occupy the whole aperture, the thickened calcareous band resembling a lower lip, while in others the operculum occupies only a small portion. All the specimens I have seen have been cast on the beach and been dried, so that it is impossible to say whether the anterior membranous layer is closely adherent to the calcareous lamina.

EXPLANATION OF FIGURES.

PLATE 48.—Fig. 8, specimen, natural size. Fig. 8*a*, portion, magnified. Fig. 8*b*, small portion, more highly magnified, one cell still covered with the membranous layer, the other showing the calcareous lamina and denticulate openings. The small round prominence above the cell on the left has the margin too distinctly rimmed. Fig. 8*c*, group, to show the ovicell. The cells, except the anterior part of that with which the ovicell is incorporated, are still covered with membrane, and the large operculum of the large cell is seen projecting below the opening of the ovicell. Fig. 8*d*, small group, to show the anterior membranous part. There is frequently a much larger portion occupied by membrane than is here represented.

All the *Escharidæ* on this plate have been described, and specimens of each presented to the National Museum, by Mr. MacGillivray.

FREDERICK McCOY.

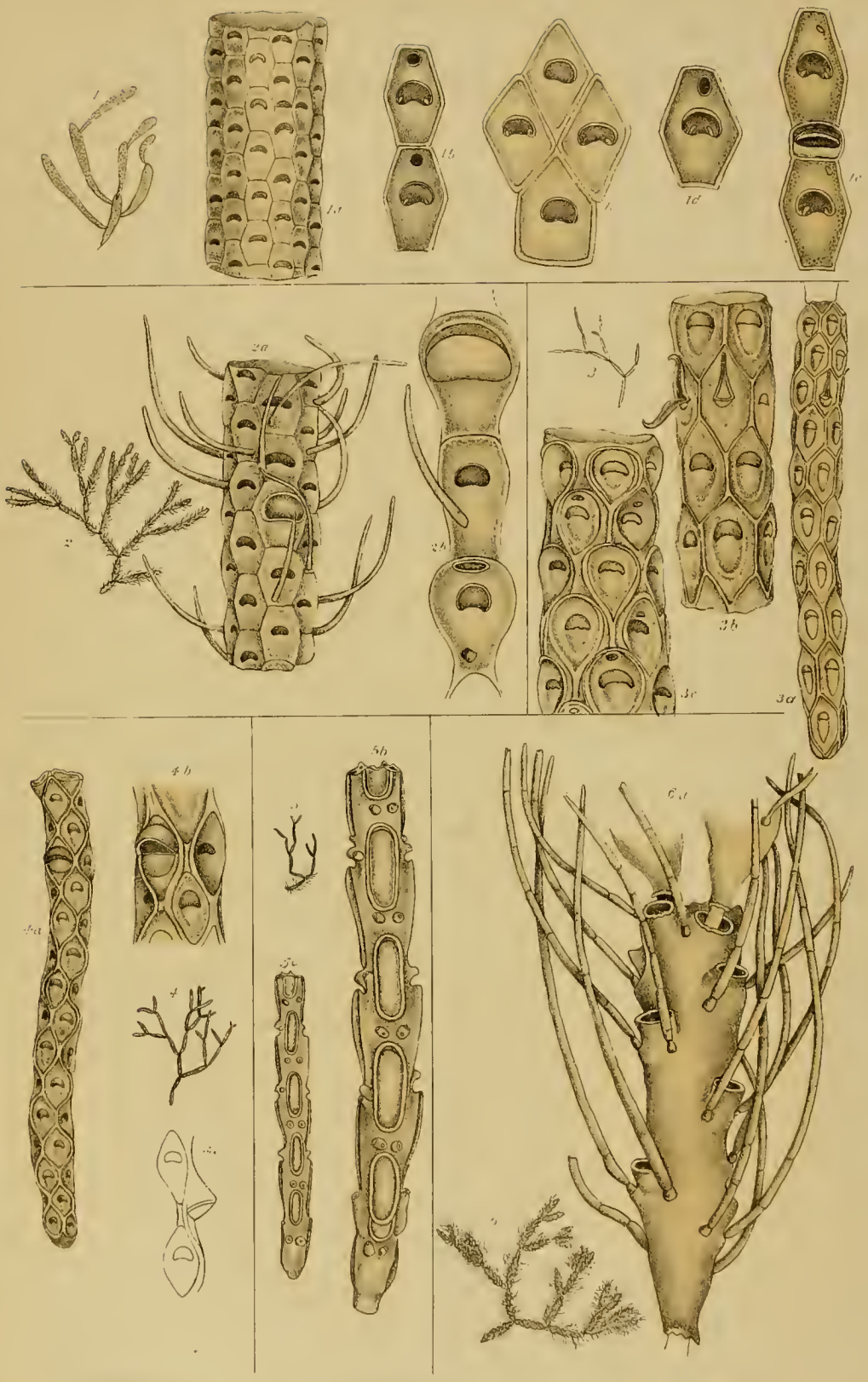

1
1a
1b
1c
1d
1e
2
2a
2b
3
3a
3b
3c
4a
4b
4
4c
5
5a
5b
6a
6

PLATE 49, FIG. 1.

CELLARIA FISTULOSA (LINN.).

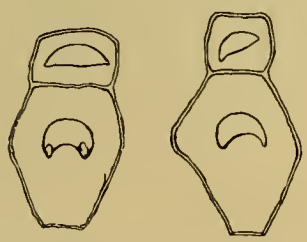
[Genus CELLARIA (LAMX.) = SALICORNARIA (CUVIER). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Salicornariidæ.)
Gen. Char.—Cells distinct, separated by raised margins, much depressed in front; no aperture.]

DESCRIPTION.—Internodes long and thick; cells in a series contiguous, usually elongated and six-sided, straight or slightly arched above and below; surface finely granular or nearly smooth; separating margins smooth or finely crenulated on the edges; mouth central, arched above, lower lip arched upwards and forwards, with frequently a minute rounded denticle inside each angle. Avicularia placed between two cells in a longitudinal series, mandible shallow, wide, rounded above, and directed upwards. Ovicell opening by a round pore.

REFERENCE.—*Salicornaria farciminoides*, Busk, Cat. Mar. Pol. Brit. Mus. p. 16, t. lxiv., figs. 1, 2, 3; t. lxv. (*bis*), fig. 5; Hincks, Brit. Mar. Polyzoa, p. 107, pl. xiii., figs. 1–4.

Queenscliff; Portland, Mr. Maplestone; on roots of algæ.

The internodes are of large size, sometimes three-quarters of an inch long, and thick, containing numerous series of cells. The usual form of the cells is elongated hexagonal, straight or slightly arched above and below; occasionally they are rhomboidal or five-sided. The surface is minutely granular. The mouth is generally central, but in some portions, especially at the growing extremities, it is nearer the upper end of the cell. The upper lip is arched, smooth or minutely crenulate; the middle of the lower lip usually projects forwards and upwards, and there is frequently a small denticle on either side. The ovarian pores are round, sometimes elongated longitudinally or transversely. The avicularia do not take the place of cells, but are placed between those of a longitudinal series, and are distinct from them; the mandible is very wide, shallow and convex above, and is directed upwards.



Additional views of cells and avicularia of *C. fistulosa*, magnified fifty diameters, as shading in plate is not satisfactory.

* In different descriptions "zoarium" is used for "polyzoary," "zoœcium" is used for "cell," and "oœcium" is used instead of "ovicell."

There has been great confusion about the European species *C. fistulosa* and *C. sinuosa*, and, judging from the descriptions and figures, I thought this a distinct species, and had marked it *C. australis*. *C. sinuosa* is distinguished by the large, frequently oblique avicularium, with a triangular, acutely pointed mandible directed downwards. According to Busk (Crag Polyzoa, p. 23) the mandible in *C. fistulosa* is small, semicircular, blunt; and it is so figured in the British Museum Catalogue, where the two species are united. Smitt describes the mandible as semicircular, and figures it as very small. Hincks, however, in his recently published British Marine Polyzoa, describes the mandible as being very shallow and arcuate, and one of his figures (pl. xiii., fig. 3) differs from our form only in being rather narrower. The Australian specimens seem to be stouter, with a larger number of series in the cylinders, and might be named var. *australis*.

There is no doubt that the generic name of *Cellaria*, as defined by Lamouroux, ought to be retained for the present genus, and it is equally proper that the specific name *fistulosa*, originally given by Linnæus, although in reality incorrect, should be adopted.

Explanation of Figures.

Plate 49.—Fig. 1, specimen, natural size. Fig. 1*a*, portion of an internode, magnified. Fig. 1*b*, 2 cells, more highly magnified, showing the ovarian pores. Fig. 1*c*, group of cells from another portion of the same specimen. Fig. 1*d*, single cell, showing a large, oval, ovarian pore. Fig. 1*e*, 2 cells, with an avicularium between them; in each cell a small rounded ovarian pore is shown situated towards one side of the upper part. (The avicularium is not properly shaded.)

Plate 49, Fig. 2.

CELLARIA HIRSUTA (P. MacGil.).

Description.—Cells in a series contiguous; surface granular; mouth central, lower lip arched upwards, usually with a minute denticle at either side internally; a long corneous tubular process from the base of the cell. Avicularium replacing a cell; mandible very large, semicircular. Ovicell opening by a lunate pore.

Reference.—*Salicornaria id.*, P. H. MacGillivray, Trans. Roy. Soc. Vict., 1868.

Queenscliff; Portland, Mr. Maplestone; frequent.

Forms tufts 1 to 2 inches high. The cylinders frequently present, towards the superior extremity, swollen portions corresponding to the situation of the immersed ovicells. The form of the cell varies, being hexagonal, rhomboidal, with the upper and lower edges straight, or the upper arched or pointed; frequently the upper end is arched, and the lower part much contracted. The forms of the cells are very similar to those described in the last species. At the base of each cell there is generally a long, hollow, corneous process; in some specimens each cell has 2; and occasionally they are wanting, but never from all the cells of a polyzoary; they are distinct from the radical tubes, which may be occasionally seen arising from the same cells at the base of an internode. The ovicell is totally immersed; the ovarian pore is widely lunate, at the summit of an ordinary cell. The avicularium is of great size. It takes the place of a cell in a series; it is larger than the adjacent cells and of a similar form; the mandible is very large, semicircular, and occupies about a third of the cell.

Explanation of Figures.

Plate 49.—Fig. 2, specimen, natural size. Fig. 2*a*, portion of internode, magnified. Fig. 2*b*, small portion of a series, more highly magnified, showing above an avicularium, and in the lower cell an ovarian pore.

Plate 49, Fig. 3.

CELLARIA TENUIROSTRIS (Busk).

Description.—Polyzoary small, formed of long narrow cylinders; cells in a series distant, elongated, usually hexagonal and pointed above and below, sometimes wide and arched above; mouth arched above, lower lip arched forwards, and sometimes with a minute denticle at either side. Ovicell deeply immersed, opening by a round pore at the upper part of a cell. Avicularium replacing a cell, mandible very long, narrow, and pointed upwards.

Reference.—*Salicornaria id.*, Busk, Cat. Mar. Pol. Brit. Mus., p. 17, pl. lxiii., fig. 4.

Queenscliff; Sealer's Cove and Cape Le Febre, Baron von Mueller.

This species forms small glassy tufts. The internodes are narrow, and consist of a few series of cells. The cells are usually nearly hexagonal and pointed above and below ; the separating margins are much raised, generally smooth ; the surface also is smooth or very obscurely granular. The mouth is situated rather above the middle ; the upper lip is lofty and arched ; the lower lip is also arched upwards, and frequently has a small denticle at either end. In some specimens the cells are much wider and rounded above. These are more frequently found in the expanded portions where the deeply immersed ovicells are situated. The ovarian pores are small, and situated at the upper part of a cell. The avicularia take the place of cells in a series ; the mandible is very long and narrow.

EXPLANATION OF FIGURES.

PLATE 49.—Fig. 3, specimen, natural size. Fig. 3*a*, an internode, magnified. Fig. 3*b*, small portion, more highly magnified, showing 2 avicularia. Fig. 3*c*, small portion of the form with the wider cells rounded above, and showing the ovarian pores.

PLATE 49, FIG. 4.

CELLARIA GRACILIS (BUSK).

DESCRIPTION.—Polyzoary small; cells in a series distant, elongated, hexagonal, usually pointed above and below; surface minutely granular; mouth at or above the middle, arched above, lower lip also slightly arched upwards. Avicularium replacing a cell, mandible very large and semicircular.

REFERENCE.—*Salicornaria id.*, Busk, Cat. Mar. Pol. Brit. Mus., p. 17, pl. lxiii., fig. 3 ; pl. lxv. (*bis*), fig. 2.

Queenscliff ; Sealer's Cove, Baron von Mueller.

In this and the preceding species, the size and habit of growth, and the size and appearance of the cells, are very similar, and in the absence of the avicularia it would be impossible to distinguish them with certainty. These organs, however, are very characteristic. In both they take the place of cells in a series. In *C. tenuirostris* the mandible is long, narrow, and pointed upwards, while in

C. gracilis it is very broad and semicircular. I have not seen the ovarian pores in the present species.

Explanation of Figures.

Plate 49.—Fig. 4, specimen, natural size. Fig. 4*a*, an internode, magnified. Fig. 4*b*, small portion, more highly magnified, showing an avicularium. Fig. 4*c*, outline of 2 cells and profile of avicularium, to show the projection of the rostrum.

Plate 49, Fig. 5.

NELLIA OCULATA (Busk).

[Genus NELLIA (Busk). (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Cheilostomata. Fam. Salicornariidæ).
Gen. Char.—Cells distinct, convex in front, aperture large.]

Description.—Cells quadriserial, few in each series (about 4 or 5), projecting above, of nearly uniform width; aperture large, of same width throughout, rounded above and below, and with a thickened margin; 2 small, hollow, rounded processes below the aperture, perforated at the summit by 1 or 2 minute openings, which are occasionally occupied by avicularia.
Reference.—Busk, Cat. Mar. Pol. Brit. Mus., p. 18, pl. lxiv., fig. 6; pl. lxv. (*bis*), fig. 4.

Parasitic on algæ and zoophytes, Queenscliff.

Forms small glassy tufts. It is readily recognised by the shape of the aperture, and the presence of the 2 rounded hollow processes at the base of the cell. These processes are pierced by 1 or occasionally 2 small apertures on the summit. According to Smitt (Floridan Bryozoa), these apertures are occupied by small avicularia, and in a few instances I have been able to detect them. The upper part of the cell, when seen in profile, forms a marked projection below the submarginal processes of the cell above.

Explanation of Figures.

Plate 49.—Fig. 5, specimen, natural size. Fig. 5*a*, internode, magnified. Fig. 5*b*, the same, more highly magnified.

PLATE 49, FIG. 6.

TUBUCELLARIA HIRSUTA (BUSK).

[Genus TUBUCELLARIA (D'ORBIGNY) = ONCHOPORA (BUSK) in part. (Sub-kingd. Mollusca. Class Polyzoa. Order Infundibulata. Sub-Order Chielostomata. Fam. Salicornariidæ.)

Gen. Char.—Cells convex, ventricose, confluent, indistinct; mouth produced into a tube; no raised margin, and no aperture.]

DESCRIPTION.—Polyzoary of rather short internodes; mouth prolonged forwards into a slightly projecting tube; on each side below the tubular portion a long, hollow, jointed, tubular process is articulated.

REFERENCE.—*Onchopora id.*, Busk, Mic. Journ., vol. iii., p. 320.

Queenscliff; Western Port, Sir George Verdon; Cape Otway, Mr. J. Payter; Portland, Mr. Maplestone.

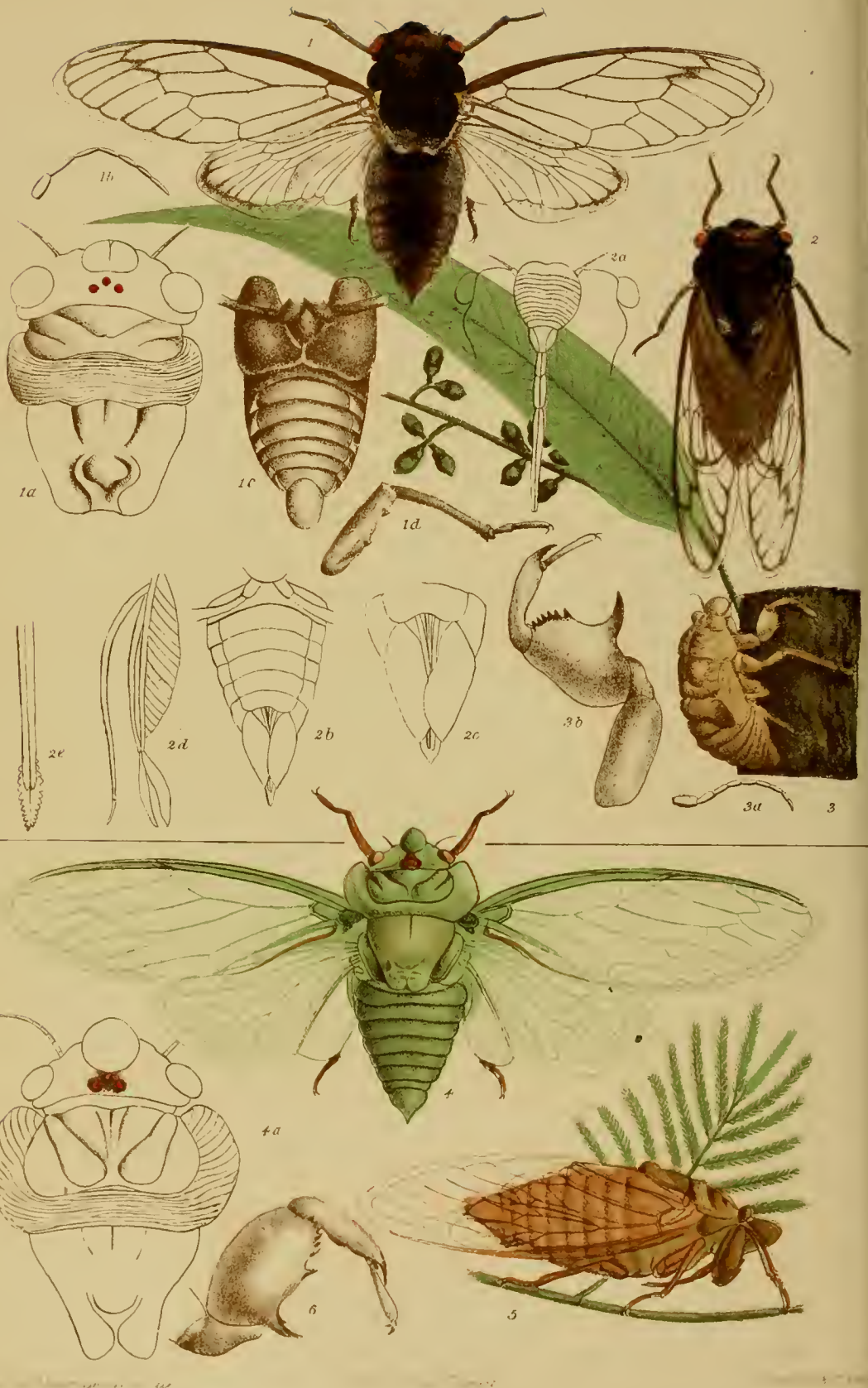
This very peculiar species occurs in tufts, 1 to 2 or 3 inches high. The internodes are short and thick. The cells are of large size; the surface (in dried specimens) divided into minute areas bordered by chain-like rows of small punctations. The mouth of the cell projects slightly in a tubular form, and on each side, at the commencement of this projection, is a long, hollow, jointed corneous process. This is quite different from the radical processes, which are of about the same thickness, and may be occasionally seen at the base of an internode, twisted cable-like and curled at the ends. There is in many cells a small round or oval, raised pore below the mouth. This is frequently wanting, and is probably an avicularium.

EXPLANATION OF FIGURES.

PLATE 49.—Fig. 6, specimen, natural size. Fig. 6, small portion, magnified.

All the specimens of *Salicornariæ* figured on this plate have been presented with the above descriptions by Mr. MacGillivray.

FREDERICK MCCOY.


1
1b
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1c
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2b
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5

PLATE 50, FIG. 1.

CICADA MŒRENS (GERM.).

THE GREAT BLACK, OR MANNA CICADA.

[Genus CICADA (LINN.). (Sub-kingd. Articulata. Class Insecta. Order Hemiptera. Tribe Homoptera. Sect. Trimera. Fam. Cicadidæ. Sect. Octicella.)

Gen. Char.—Head large, wide, short. Eyes round, of moderate size, very prominent, above the anterior edge of the prothorax; 3 small ocelli in a group on top of head. Prothorax transverse, not dilated at the sides; mesothorax not deeply notched behind. Sound-drums of males moderately open above, not forming large sacks on the sides; opercula not much lengthened. Tarsi of 3 joints.]

DESCRIPTION.—Above, and legs, and veins of wings, brownish-black, with few greyish hairs, most numerous on the sides of the abdominal segments; two yellowish-brown spots, their own diameter apart, on middle of posterior edge of mesothorax, and two much smaller spots of bright amber hairs, one at each anterior lateral angle; underside of abdomen light-yellowish brown; eyes orange; ocelli red; anterior wings with an oblique *W*-shaped brown mark on transverse veins at distal ends of 1st and 2nd disc-areolets; hinder wings with distal edges of marginal areolets thickened with dark-brown. Length of body, 1 inch 5½ lines; length of anterior wing, 1 inch 9 lines; expanse, 3 inches 10 lines. Length of pupa, 1 inch 4 lines; pupa skin of a pale horn color.

The sexes are nearly alike in size and color, but are of course easily distinguished by the male having the two large, subtrigonal, dark-brown covers to the sound organs on the undersides of junction of thorax and abdomen; while the female wants the sound organs, but has the sides of the 8th joint of the abdomen enlarged and inflected below to cover the ovipositor and saw. The joints and a few stripes on the anterior legs are pale-brownish, and the middle of the thorax between base of legs below brownish black. Some specimens are more tomentose than others, but the hairs rarely form distinct patches on the sides; the sides of the thorax below are covered with pale, close hairs. On the whole the species varies very little in size or color. The sulci on the thorax, and the relative proportions of the cells of the wings, are accurately represented in our figure, and need not be described. The basal areolet of the anterior wings is hyaline. Two or 3 small triangular teeth on outer edge of anterior thighs.

REFERENCE.—Germar in Silbermann's Revue Entom., vol. 2, p. 67.

The Cicadæ, forming the old genus *Cicada* of Linnæus, constitute now the family *Cicadidæ*, to the section *Octicelli* of which (or those having 8 marginal cells to the upper wings) the two kinds figured on our plate belong. They are the largest and most famous of the Homopterous insects, remarkable above all things for the loud song or chirping whir of the males in the heat of the summer. Our *Cicada mœrens*, here figured for the first time, produces an almost deafening sound from the numbers of the individuals in the

hottest days, and the loudness of their noise; which, beginning with a prolonged high-toned whir like that of a knife-grinder, or the letter R loudly prolonged in a high pitch, continued for a minute or two, breaks into a series of diminuendo "squawks," like that of a frightened duck in a farmyard, loud enough to be heard some hundred yards off, and stunning our ears with the shrilling and squalling. This kept up with "damnable iteration," as Falstaff says, by hundreds of individuals all day long, would tax the patience of a saint, if such existed in Australia. One might almost say with Virgil, "*Et cantu querulæ rumpent arbusta Cicadæ*,"* only to burst the Australian "bush" would be rather too much even for their distracting powers. The oratory of Plato must have been very annoying if as like the utterance of our insect as it was said to have been like that of the Greek *Tettix*, "Ἡδύεπτος Πλατων, καὶ τεττιξιν ισολαλος."

There is certainly no Australian insect so likely to remind the classic scholar of the studies of his youth, or remind the schoolboy of a greater number of passages in the old Greek and Latin poets than our *Cicada*. There is scarcely an allusion in the Greek poets, from Homer to Anacreon and Theocritus, referring to the *Tettix* of their country which could not as well apply to the Victorian *Cicada mœrens;* some of Anacreon's odd hyperbolical praises in his 43rd Ode being, however, as inapplicable to one as the other. It is very curious to see Virgil's remark, "*Raucis sole sub ardenti resonant arbusta Cicadis*,"† on the Italian *Cicada* holding good for this Australian one, which seems to sing all the louder the more burning the sun's rays. All the classic jokes about the happiness of these boisterous males because their wives are dumb may be applied by Australian ascetics to our insect, as well as a multitude of other references in the poets of antiquity, showing a repetition or "representation" of the structure and habits of the European *Cicada* in its commonest Australian representative which is very remarkable.

The Greeks keeping the *Tettix* in cages for the sake of their song, and praising their musical performances so highly, one might

* Georg. 3, 327. † Buc. 2, 12.

almost think indicated a great falling off in their powers to please in our day. As the Chinese, however, do exactly the same still with their *Cicada*, I fancy (as the *Cicadæ* are too great conservatives to change) that the real fact may be that the ancient Greek taste for music may have resembled the execrable modern Chinese one, which, as I have heard it grandly exemplified in some of their theatres on the goldfields, might be said in its din to be diabolical—if the comparison were not perhaps unfair to the absent.

After the singing has drawn attention to the perfect insect having emerged from the pupa skin, the females may be seen ascending the trees until some dry twig is reached, in which they cut a groove with the saw-like plates forming the jagged edges of the broad spear-head at the posterior end of the long, horny, cylindrical borer at the hinder extremity of the abdomen; and in each groove they deposit a few eggs. The young, as Réaumur remarked of the European *Cicada*, resemble fleas in size and shape; they quickly reach the ground, into which they burrow, and whence they may be dug out at the roots of trees any time during the larval and pupa states. The larva is white, and seems to feed on underground roots; the eyes, 6 legs, and antennæ, agreeing with the pupa, as figured on our plate, which chiefly differs in having the rudimentary wings visible at the sides of the body. The pupæ ultimately come out of the ground, crawl up a few feet on the trunk of the nearest Gum-tree in the night, and then, splitting along the back, the surprisingly larger, winged, perfect insect creeps out, leaving the empty pupa skin clinging to the tree quite perfect, even to the smallest hair or other part, in the position of life. These are what Aristotle called the *Tittigometra*, or mother of the *Cicadæ*, from a recognition of the fact of the perfect, winged, *Cicadæ* (*Tettix* of the Greeks) coming forth from them.

This large species of *Cicada* piercing the young twigs of the Peppermint Gum-tree (*Eucalyptus viminalis*) causes an abundant exudation of sap, which, drying in the hot parched air of the midsummer, leaves the sugary solid remains in a gradually increasing lump, which ultimately falls off, covering the ground with a sort of white sweet manna in little irregular masses. This particular kind of manna is the "Melitose" of chemists ($C^{12}H^{22}O^{11}$),

and contains the peculiar material "Eucalin" ($C^6H^{12}O^6$) (only known in the sap of *Eucalypti*), an unfermentable sugar, with another fermentable sort (perhaps *Dextroglucose*), from which it may be separated by fermenting the Melitose.

Both sexes have short lives in the perfect state, and may be seen lying about the ground under the trees, dead or dying, in abundance after their noisiest few days. Our Nankeen Kestrel and other small hawks devour them on the wing in great numbers in their season, and they are probably very nice, like the Greek ones praised by Aristotle as a *bonne-bouche*. The pupæ, the bachelor males, and the females when full of eggs, are the greatest delicacies for the epicure, according to the Greek authority, but none of my friends have enabled me to say whether in their opinion the Australian species merits the like praise.*

This species has not been figured before, although occurring in abundance everywhere throughout Victoria, and extending to Tasmania on the south, and to New South Wales and Queensland on the north.

It appears in myriads about February and in the beginning of March. At these times the empty pupa cases may be seen sticking on the bark of the Gum-trees, particularly the Peppermint Gum, *Eucalyptus viminalis* (the *E. mannifera* of Cunningham), which the perfect insect chiefly frequents, probably from the remarkable sweetness of the sap.

Explanation of Figures.

Plate 50.—Fig. 1, male, natural size, with the wings expanded. Fig. 1*a*, thorax of same, magnified to twice the natural size, to show the markings and proportions of the three divisions of the thorax seen from above. Fig. 1*b*, one of the antennæ of same, magnified five times the natural size. Fig. 1*c*, underside of same, showing the two large plates of the musical organs characteristic of the males, at junction of thorax and abdomen. Fig. 1*d*, anterior leg of same, twice the natural size, to show the toothing. Fig. 2, female, in resting position of the deflexed wings, natural size. Fig. 2*a*, rostrum on underside of head of same, magnified. Fig. 2*b*, underside of abdomen, to show absence of the drum-plates at the anterior end and the large inflected

* Since the above was in type Prof. Strong drew my attention to a passage referring to the song of the *Cicada* in "The Birds" of Aristophanes, charmingly rendered as follows in Dr. Kennedy's translation :—

"But in flowery meads I dwell,
Lingering oft in leafy dell,
When the inspired Cicala's gladness,
Swelling into sunny madness,
Filleth all the fervid noon
With its shrill and ceaseless tune."

covers for the borer at the posterior end. Fig. 2*c*, posterior end of same, more highly magnified. Fig. 2*d*, side view of borer, drawn out from the two lateral pieces of the sheath, the terminal joint of which is movable to receive the enlarged end of the borer. Fig. 2*e*, front view of borer, to show the two portions which move up and down against each other and dilate at the tip with serrated edges. Fig. 3, pupa case of same, split along the back to allow the winged adult to escape, natural size; with bark, leaf, and unopened flowerbuds of the Manna—or Peppermint Gum (*Eucalyptus viminalis*), which they frequent, showing the short peduncles and 3 flowerbuds, usual in the species, with the characteristic proportions of short pedicels, calyx tubes, and operculum. Fig. 3*a*, antenna of same, to show the difference from that of the adult. Fig. 3*b*, anterior leg, magnified.

Plate 50, Fig. 4.

CYCLOCHILA AUSTRALASIÆ (Donov. sp.).

The Great Green Cicada.

[Genus CYCLOCHILA (Amyot et Serv.). (Sub-kingd. Articulata. Class Insecta. Order Hemiptera. Tribe Homoptera. Sect. Trimera. Fam. Cicadidæ. Sect. Octicella.)

Gen. Char.—Body not hairy. Head large, triangular; front strong, pointed, without longitudinal mesial sulcus. Eyes large, oval, prominent. Prothorax transverse, dilated and rounded on the laterally extended sides. Mesothorax slightly notched behind. Anterior and posterior wings transparent. Tarsi with 3 joints.]

Description.—Head, body above and below, legs and veins of both pairs of wings and basal disc pale-yellowish grass-green, or pale-tawny horn-brown, or various irregular mixtures of these two colors. Eyes yellowish-grey; ocelli amber-red, surrounded by a small black patch; membrane of both pairs of wings clear and unspotted. Length (male) of head and body, 1 inch 9 lines; length of anterior wing, 1 inch 11 lines; expanse from tip to tip, 4 inches 4 lines. Length (female) of head and body, 1 inch 9 lines; length of anterior wing, 2 inches 1 line; expanse, 4 inches 8 lines. Anterior thighs with two long equal conical spines, one near each end, and a third small one in front near joint. Length of pupa, 1 inch 6 lines.

Reference.—*Tettigonia Australasiæ* (Donov.), Ins. N. H. Hem., t. 2, f. 1; = *Cicada olivacea* (Germar), Silb. Rev. ii., 57, 4; = *Cyclochila id.* (Amyot et Serv.), Hist. Nat. Hem., p. 470.

The males and females are much alike in color, but the females are often larger in expanse of wings, and have the head a little more acute than the males. The variation from all grass-green to all pale testaceous tawny-brown is so gradual and irregular when a large series is examined that there cannot be a doubt of both extremes belonging to one species. The great width of the circularly dilated margin of the prothorax between the head and the wings is the main generic peculiarity separating this from the other Cicadæ, with which it agrees in most other points of structure.

This species is much less abundant than the *C. mœrens*, and seems more confined to moist places, such as river banks and deep ravines and gullies. The song begins like the quacking of a duck for some time before breaking into the continuous "whir," and is far louder than that of the *C. mœrens*, becoming perfectly unbearable and deafening where they abound. It seems to frequent the various species of *Acacia* (popularly called Wattles) quite as often or more often than the *Eucalypti*. It appears at about the same time as the *C. mœrens* in the hottest time of the year, but is much less widely distributed. It is not uncommon along the banks of the Yarra, near Melbourne. The pupa resembles that of the *C. mœrens*, but is larger, and the tooth-like spines on the anterior legs are darker, larger, and stronger; and the large basal tooth has a small additional spine near its base.

Explanation of Figures.

Plate 50.—Fig. 4, male, natural size, with wings expanded. Fig. 4*a*, thorax and head of same, magnified, to show circularly dilated thin margin. Fig. 5, female, with the wings deflexed in resting position on the common Wattle (*Acacia decurrens* [var. *mollissima*]), which it frequents. Fig. 6, anterior leg of pupa, magnified, to compare with fig. 3*b* of *C. mœrens*.

Frederick McCoy.

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PLATE 39.—Crisia Edwardsiana (D'Orb. sp.).—C. biciliata (McG.).—C. acropora (Busk).—C. setosa (McG.).—C. tenuis (McG.).
PLATE 40.—Saunders' Case-Moth (Metura elongata, Saunders sp.).
The Lictor Case-Moth (Entometa ignobilis, Walk.).

DECADE V.

PLATE 41.—The Lace Lizard (Hydrosaurus varius, Shaw sp.).
PLATE 42.—The Spotted Marsh-Frog (Lymnodynastes Tasmaniensis, Günth.).—The Common Sand-Frog (Lymnodynastes dorsalis, Gray).
PLATE 43.—The Carpet Shark (Crossorhinus barbatus, Lin. sp.).—The Seven-gilled Shark (Notidanus [Heptanchus] Indicus, Cuv.).
PLATE 44.—The Barracouta (Thersites atun, Cuv.).—The Tunny (Thynnus Thynnus, Lin. sp.).
PLATE 45.—Flustra denticulata (Busk).—Carbasea episcopalis (Busk).—C. dissimilis (Busk).—C. indivisa (Busk).—C. elegans (Busk).—C. pisciformis (Busk).
PLATE 46.—Spiralaria florea (Busk).—Diachoris Magellanica (Busk).—D. spinigera (P. McGil.).—Dimetopia spicata (Busk).—D. cornuta (Busk).—Didymia simplex (Busk).—Calwellia bicornis (Wyv. Thomson).
PLATE 47.—Dictyopora cellulosa (P. McGil.).
PLATE 48.—Eschara obliqua (P. McGil.).—E. dispar (P. McGil.).—E. gracilis (Lamx.).—E. platalea (Busk).—E. quadrata (P. McGil.)—E. mucronata (P. McGil.).—Caleschara denticulata (P. McGil.).
PLATE 49.—Cellaria fistulosa (Linn.).—C. hirsuta (P. McGil.).—C. tenuirostris (Busk.).—C. gracilis (Busk).—Nellia oculata (Busk).—Tubucellaria hirsuta (Busk).
PLATE 50.—The Great Black, or Manna Cicada (Cicada mœrens, Germ.).—The Great Green Cicada (Cyclochila Australasiæ, Donov. sp.).

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MARY D. ROGICK